Mac OS X Fibre Channel connectivity to the HP StorageWorks Enterprise Virtual Array storage system configuration guide

Contents

Figures

Tables

About this guide

This guide provides information about:

- Apple Mac OS X connectivity
- Installing and configuring ATTO Technology's Celerity Fibre Channel Host Adapter (Celerity FC host adapter)
- Multipath configurations

Intended audience

This guide is intended for system administrators who are installing the Celerity FC host adapter for Mac OS X with the HP StorageWorks Enterprise Virtual Array (EVA) storage system. They must be familiar with:

- HP StorageWorks 4x00/6x00/8x00 Enterprise Virtual Array (EVA4x00/6x00/8x00), HP StorageWorks 4400 Enterprise Virtual Array (EVA4400), or HP StorageWorks 6400/8400 Enterprise Virtual Array (EVA6400/8400) storage system
- HP StorageWorks Command View EVA
- HP Fibre Channel storage area network (SAN)
- Mac OS X operating system

Related documentation

The following documents and websites provide related information:

- *HP StorageWorks Command View EVA user guide*
- *HP StorageWorks Command View EVA online help*
- *HP StorageWorks SAN design reference guide*
- *HP StorageWorks 4x00/6x00/8x00 Enterprise Virtual Array user guide*
- *HP StorageWorks 4400 Enterprise Virtual Array user guide*
- *HP StorageWorks 6400/8400 Enterprise Virtual Array user guide*
- *ATTO Celerity 4-Gb and 8-Gb Host Adapter Installation and Operation Manual*
- *ATTO Utilities Installation and Operation Manual*

You can find the HP StorageWorks documents on the Manuals page of the HP Business Support Center website: http://www.hp.com/support/manuals. In the Storage section, click **Storage Software**, and then select your product.

You can find the ATTO documents on the ATTO Support Product Information website:

http://www.attotech.com/software/manuals.html

Document conventions and symbols

Table 1 Document conventions

Convention	Element
Blue text: Table 1	Cross-reference links and e-mail addresses
Blue, underlined text: http://www.hp.com	Website addresses
Bold text	• Keys that are pressed • Text typed into a GUI element, such as a box • GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
Italic text	Text emphasis
`Monospace` text	• File and directory names • System output • Code • Commands, their arguments, and argument values
`Monospace, italic` text	• Code variables • Command variables
`Monospace, bold` text	Emphasized monospace text

HP technical support

For worldwide technical support information, see the HP support website:

http://www.hp.com/support

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

http://www.hp.com/go/e-updates

After registering, you will receive e-mail notification of product enhancements, new driver versions, firmware updates, and other product resources.

HP websites

For additional information, see the following HP websites:

- http://www.hp.com
- http://www.hp.com/go/storage
- http://www.hp.com/service_locator
- http://www.hp.com/support/manuals
- http://www.hp.com/support/downloads

Documentation feedback

HP welcomes your feedback.

To make comments and suggestions about product documentation, please send a message to storagedocsFeedback@hp.com. All submissions become the property of HP.

1 Mac OS X connectivity overview

HP supports Fibre Channel (FC) connectivity of Mac OS X on its Enterprise Virtual Array (EVA) storage systems using ATTO Technology's Celerity Fibre Channel host adapters.

HP provides Mac OS X users with high-throughput workflows that:

* Minimize data movement and duplication to increase efficiency
* Streamline editing and collaboration to accelerate time-to-market
* Provide highly scalable capacity to accommodate rapid, unpredictable growth

HP and ATTO Technology have partnered to develop a host adapter driver *specifically* for EVA storage systems. The driver includes multipath software to utilize the active/active ports on the EVA storage systems. You can use the ATTO Configuration Tool to manage paths and retrieve I/O statistics.

> ⊙ IMPORTANT:
>
> The HP-specific ATTO Celerity FC host adapter drivers and ATTO Configuration Tool are customized for use with EVA storage systems and are the only ones supported with HP storage. Other ATTO drivers are not supported. For the latest HP–specific drivers and configuration tools, see:
>
> http://www.attotech.com/solutions/hp

Supported hardware and software

For information about the latest supported drivers, see the Single Point of Connectivity Knowledge (SPOCK) at: http://www.hp.com/storage/spock.

The latest drivers can be downloaded from ATTO Technology at:

http://www.attotech.com/solutions/hp

You can also use SPOCK to check for the latest hardware and software support for Mac OS X.

Configuration guidelines

Consider the following Celerity FC host adapter guidelines:

- ATTO 4-Gb and 8-Gb FC cards (PCI-X and PCIe only) are supported.
- Latest HP-specific ATTO Celerity FC host adapter driver
- Latest HP-specific ATTO Configuration Tool
- A maximum of 256 targets per host adapter channel are supported.
- A maximum of 255 logical unit numbers (LUNs) per host adapter channel are supported.
- PowerPC- and Intel-based servers are supported.

Consider the following multipath guidelines:

- HP recommends zoning a single host adapter port world wide port name (WWPN) with a single EVA port WWPN.
- Single host adapter port WWPN zoned with multiple EVA port WWPNs to the same EVA storage system is supported.
- Single host adapter port WWPN zoned with multiple EVA storage systems is supported.
- Multiple host adapter ports support I/O load balancing.
- I/O load balancing can span multiple host adapters.

Consider the following Fibre Channel switch and fabric guidelines:

- The Celerity FC host adapter WWPN is *not* supported in zones containing other third-party host adapters.

Consider the following EVA storage system guidelines:

- HP Command View EVA 8.0 or later is supported.
- EVA4x00/6x00/8x00, EVA4400, and EVA6400/8400 storage system models are supported.
- XCS 6.100 or later is supported with EVA4x00/6x00/8x00.
- XCS 09003000 or later is supported with EVA4400.
- XCS 09501100 or later is supported with EVA6400/8400.

2 Installing the Celerity FC host adapter

This chapter describes installation of the Celerity FC host adapter and host system setup and configuration.

Setting up the host system

To set up the host system:

1. Install the Celerity FC host adapter using the procedure provided by ATTO Technology. For more information or to download the *ATTO Celerity Fibre Channel Host Adapters Installation and Operation Manual*, see the ATTO Technology website:

   http://www.attotech.com/software/manuals.html

   Under Celerity Fibre Channel Host Adapters, click **Celerity 4-Gb and 8-Gb Host Adapter Installation & Operation Manual**.

2. Install the Celerity FC host adapter driver `osx_drv_celerity_xxxMP.dmg` (where *xxx* is the latest available version), available on the ATTO Solutions for HP Customers website:

   http://www.attotech.com/solutions/hp

   Under Fibre Channel, select **Solution Details**, and then click **Obtain Drivers**.

3. Reboot the host.

4. Install the ATTO Configuration Tool driver `osx_app_configtool_xxx.dmg` (where *xxx* is the latest available version), available on the ATTO Solutions for HP Customers website:

   http://www.attotech.com/solutions/hp

   Under Fibre Channel, select **Solution Details**, and then click **Obtain Drivers**.

> **NOTE:**
> During ATTO Configuration Tool installation, select **Full Installation** when prompted.

5. Start the ATTO Configuration Tool from the Applications folder.

6. Connect the Fibre Channel cables from the host adapter ports to the Fibre Channel switch.

7. Reboot the host.

Configuring Fibre Channel zoning

This section describes the procedures to configure zoning.

Single-path connectivity

To configure zoning on B-Series switches for single-path connectivity:

1. Create a zone that contains:
   - The host adapter port WWPN
   - An EVA port WWPN
2. Add the zone to the switch configuration.
3. Enable or re-enable the switch configuration to add the zone to the fabric's current configuration.

Table 2 provides sample values for a single host zone.

Table 2 Single host zone example

Zone	Host adapter port WWPN	EVA port WWPN
EVA_Port_1_Zone	21:00...3e:ea	50:00....20:7d
EVA_Port_2_Zone	21:00...3e:eb	50:00....20:78

NOTE:

You can add hosts to each zone. You do not need to create separate zones for each host.

Multipath connectivity

The ATTO Configuration Tool is used to configure host adapters and monitor host adapters, drivers, and devices. Features include:

- Managing I/O load balancing
- Monitoring I/O paths and flagging changes in path status
- Automatic rerouting of I/O (failover) to an available path upon detection of an interrupted connection
- Invoking failover or failback operations transparent to the operating system
- Maintaining device names after reboots or SAN changes
- Setting path load balancing policies
- Viewing and resetting path statistics

For more information, see Chapter 3 on page 19.

The HP-specific Celerity FC host adapter driver includes support for establishing redundant I/O paths to the EVA. To ensure high availability and optimal performance you must set up redundant I/O paths properly.

Regardless of the complexity of your configuration, you can configure redundant paths between the Mac OS X system and the EVA in multiple ways. How you set up your multipath configuration depends on system and SAN resources.

NOTE:

HP recommends zoning a single host adapter port WWPN with a single EVA port WWPN.

The following procedure describes how to zone a host for multipath connectivity using two host adapter ports and two EVA ports:

1. Create a zone that contains:

    *   The first host adapter port WWPN
    *   An EVA port WWPN from the first controller

2. Create another zone that contains:

    *   The second host adapter port WWPN
    *   An EVA port WWPN from the second controller

3. Add the zones to the switch configuration.

4. Enable or re-enable the configuration to add the zones to the fabric's current configuration.

Table 3 provides sample values for a dual host zone.

Table 3 Dual host zone example

Zone	Host adapter port WWPN	EVA port WWPN
EVA_Port_1_Zone	21:00...3e:ea (Host 1) 21:00...54:20 (Host 2)	50:00....20:7d
EVA_Port_2_Zone	21:00...3e:eb (Host 1) 21:00...54:21 (Host 2)	50:00....20:78

Using HP Command View EVA to present LUNs to a Mac OS X host

You use the HP Command View EVA management tool to configure EVA storage systems. This section describes how to create the Mac OS X host entry and present LUNs to the host system.

Creating a host entry for a single-path Mac OS X host

To create an HP Command View EVA host entry for a single-path Mac OS X host:

1. Log on to HP Command View EVA.

2. In the Hosts folder on the Storage System pane, click **Add host**.

    By default, the host type is `Fibre Channel`.

3. Enter the name of the host in the Name box.

    HP Command View EVA displays this name in the Hosts folder.

4. Select the host adapter port WWPN from the Port World Wide Name list.

5. For a Mac OS X host, select the operating system type.

- For XCS 6.100 or later, select **Custom** from the Operating System Type list, and then enter **00000002024000A8** as the Custom type.
- For XCS 09003000 or later, select **Apple Mac OS X** from the Operating System Type list.

6. Click **Add host**.

Creating a host entry for a multipath Mac OS X host

To create an HP Command View EVA host entry for a multipath Mac OS X host:

1. Log on to HP Command View EVA.

2. In the Hosts folder on the Storage System pane, click **Add host**.

   By default, the host type is `Fibre Channel`.

3. Enter the name of the host in the Name box.

   HP Command View EVA displays this name in the Hosts folder.

4. Select the host adapter port WWPN from the Port World Wide Name list.

5. For a Mac OS X host, select the operating system type.

- For XCS 6.100 or later, select **Custom** from the Operating System Type list, and then enter **00000002024000A8** as the Custom type.
- For XCS 09003000 or later, select **Apple Mac OS X** from the Operating System Type list.

6. Click **Add host**.

7. In the Hosts folder, select the host you created in Step 3.

8. Click the **Ports** tab.

9. Click **Add port**.

10. Select the second host adapter port WWPN from the Port World Wide Name list.

11. Click **Add port**.

12. Click **OK**.

13. To add another port, repeat Step 9 through Step 12.

Creating and presenting a LUN to a Mac OS X host

To create and present a LUN to a Mac OS X host:

1. Log on to HP Command View EVA.

2. In the Virtual Disks folder on the Storage System pane, click **Create Vdisk**.

3. Enter a name for the vdisk in the Name box.

4. Enter the size of the vdisk in the Size box.

5. Select a group from the Disk group list.

6. Select a redundancy (RAID) level.

7. Select the Mac OS X host entry name from the Present to host list.

8. Click **Create Vdisk**.

Verifying the configuration

The HP-specific ATTO Celerity FC host adapter driver automatically determines the number of paths to a LUN. The ATTO Configuration Tool allows you to view path status and statistics.

To verify the configuration:

1. Start the ATTO Configuration Tool from the Applications folder.

2. Expand the Channel entry and the HSV entry in the Device Listing pane to display the LUN entries, as shown in Figure 1.
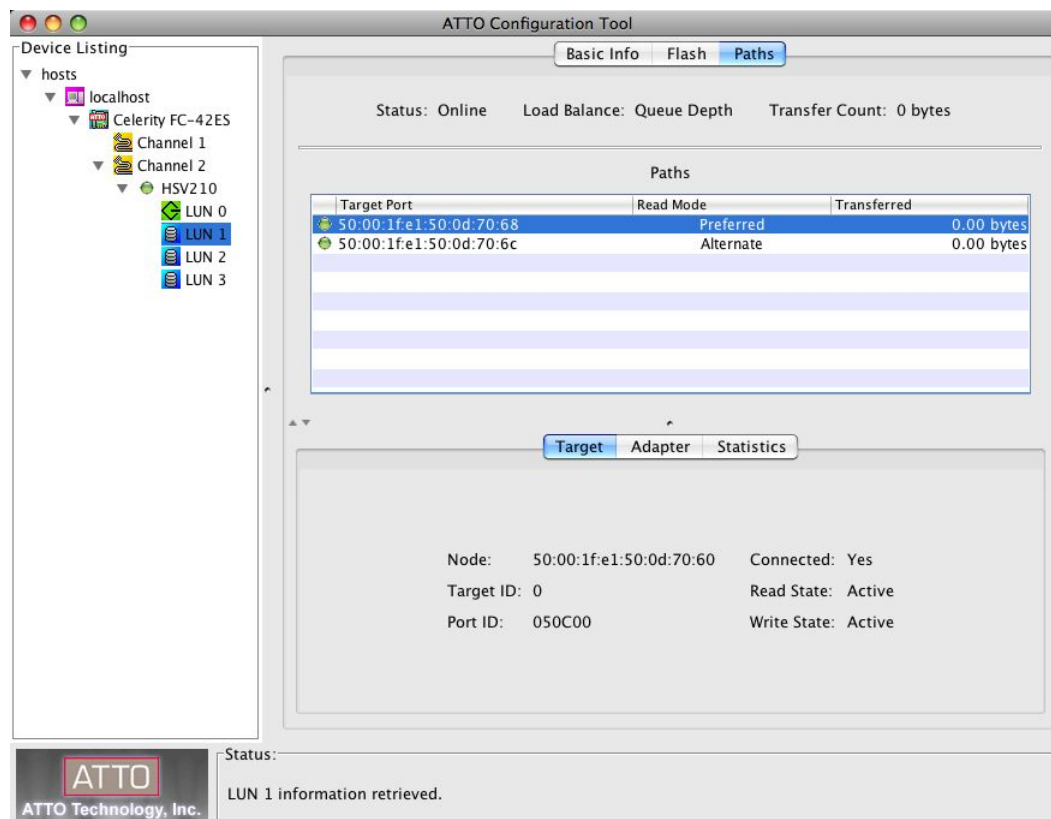
Figure 1 ATTO Configuration Tool—LUN Paths

3. Verify that:
   - Path Status is `Online`.
   - Each Target Port icon is green.
   - Each Target Port Read Mode is either `Alternate` or `Preferred`.

4. To save the configuration, right-click any path Target Port, and then select **Save Configuration**.

📝 NOTE:

The saved configuration file is used to maintain path persistence after a reboot.

---

3 ATTO Configuration Tool

You use the ATTO Configuration Tool to configure host adapters and monitor host adapters, drivers, and devices. Features include:

- Managing I/O load balancing
- Monitoring I/O paths and flagging changes in path status
- Automatic rerouting of I/O (failover) to an available path upon detection of an interrupted connection
- Invoking failover or failback operations transparent to the operating system
- Maintaining device names after reboots or SAN changes
- Setting path load balancing policies
- Viewing and resetting path statistics

△ CAUTION:

ATTO host adapters are factory set for proper operation. Entering invalid or incorrect settings with the ATTO Configuration Tool can result in unexpected behavior, such as hardware failure.

The ATTO Configuration Tool is available for download on the ATTO Solutions for HP Customers website:

https://www.attotech.com/solutions/hp/fibre_channel_eva.html

Using the ATTO Configuration Tool

To start the utility, double-click the ATTO Configuration Tool icon .

The Welcome window opens (Figure 2).
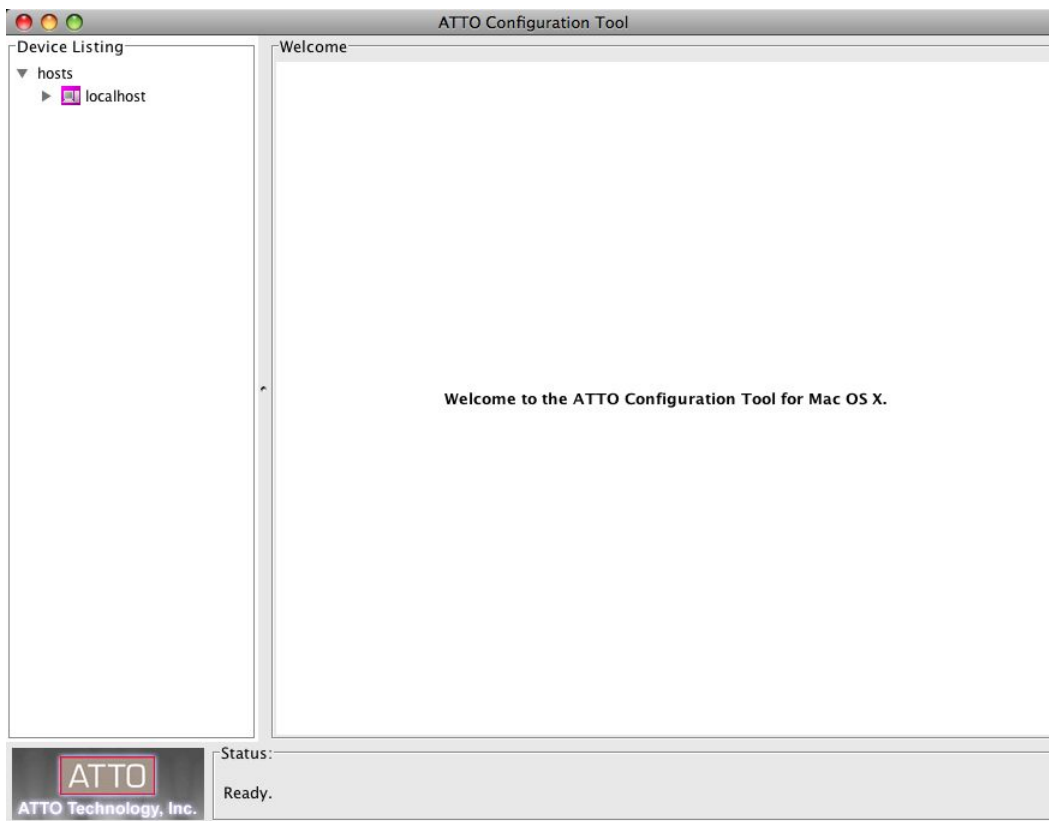
Figure 2 ATTO Configuration Tool—Welcome window

The ATTO Configuration Tool window has three panes:

- **Device Listing**—Lists the devices that are currently connected to the SAN. You can expand the device tree to view more information (Figure 3).
- **Configuration Options**—Displays details about the device you select in the Device Listing pane. Depending on the device type, there are two to five tabs that you can use to navigate the utility. Table 4 describes the tabs for each device type. If no devices are selected, the Welcome banner is displayed.
- **Status**—Displays application status, including errors and warning messages.

Figure 3 Device Listing pane

Table 4 Tabs on the Configuration Options pane

Device	Tabs
Localhost	Basic Info—Displays general information about the host Notifications—Displays notifications about the host See "Localhost device" on page 21
Adapter	Basic Info—Displays general information about the adapter Flash—Displays the current revision of the flash code Advanced—Not supported with ATTO Celerity FC Adapters See "Adapter device" on page 22
Channel	NVRAM—Displays NVRAM settings, which you can change from this window PCI Info—Displays general information about the ATTO Fibre Channel card chip and silicon See "Channel device" on page 23
EVA controller	Paths—Displays port paths to the EVA controller Target—Displays target status information for a specified port Adapter—Displays adapter status information for a specified port Statistics—Displays average and total statistics for a specified port See "EVA controller" on page 26
LUN	Basic Info—Displays general information about the LUN Flash—Not used Advanced—Not supported with Mac OS X See "LUN device" on page 33

Localhost device

Select **localhost** from the Device Listing to view information and notifications about the host system. You cannot change the information that is displayed.

Adapter device

Select an adapter from the Device Listing to view information about that adapter. You cannot change the information that is displayed. Figure 4 shows an example of a Celerity FC-42ES Basic Info display.

NOTE:

The Advanced tab is not supported with ATTO Celerity FC Adapters.
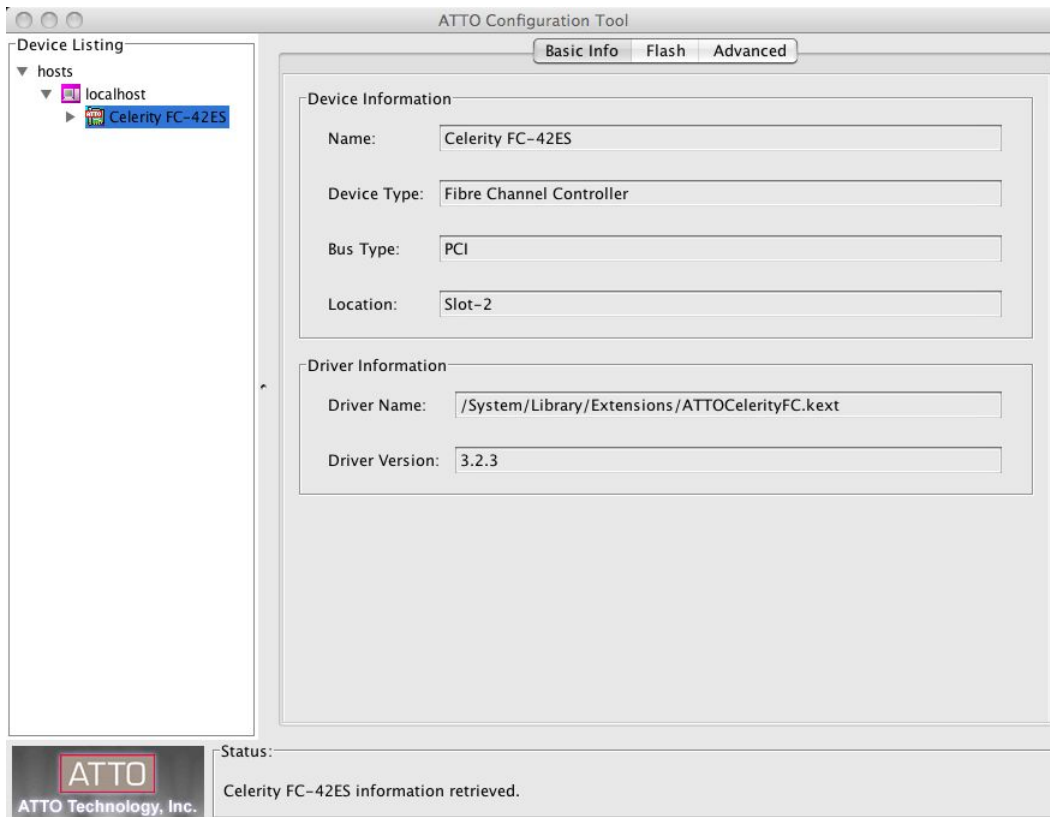
Figure 4 Adapter—Basic Info tab

Channel device

Select a channel (adapter port) from the Device Listing to view information about the ATTO Fibre Channel card (PCI Info tab) or to configure the NVRAM. Figure 5 shows an example of a channel NVRAM display.
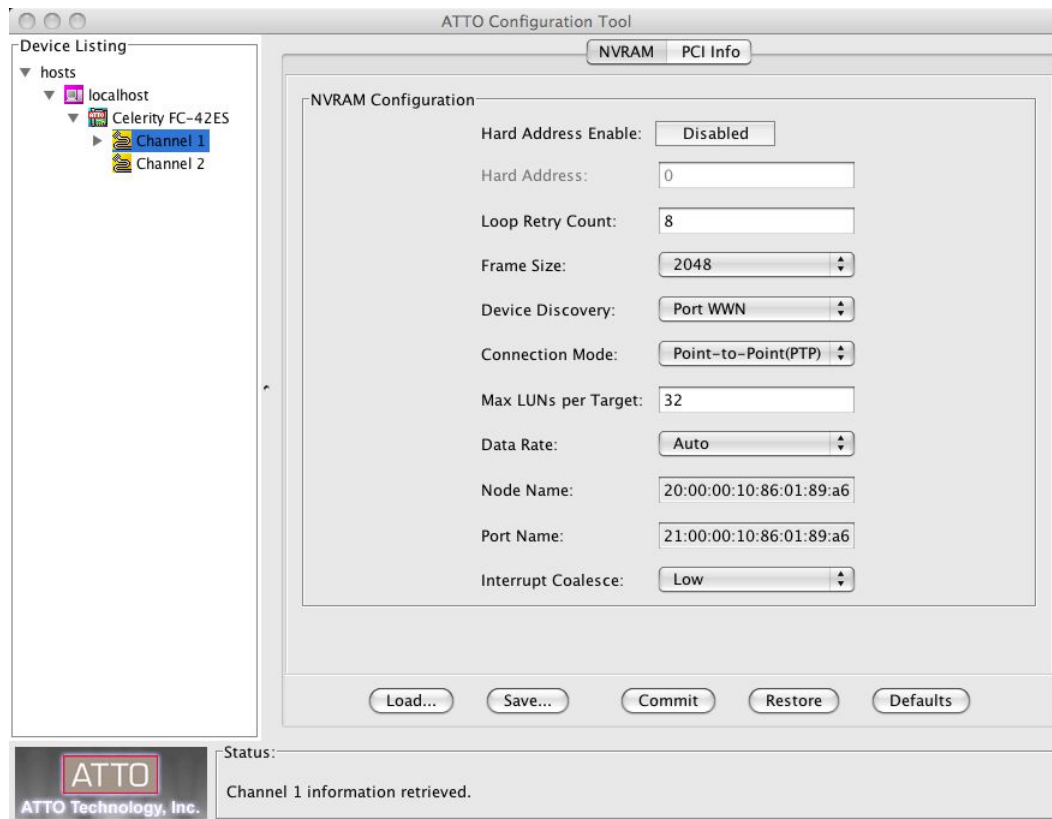
Figure 5 Channel—NVRAM tab

Configuring the NVRAM

This section provides guidelines for configuring the NVRAM. After you have NVRAM settings, click **Commit** to save the changes. You must reboot the system for the changes to take effect.

Use care when changing the NVRAM settings. Make changes only if you are sure of the results.

△ CAUTION:

ATTO host adapters are factory set for proper operation. Entering invalid or incorrect settings with the ATTO Configuration Tool can result in unexpected behavior, such as hardware failure.

Table 5 describes NVRAM settings.

Table 5 NVRAM configuration

Field	Description	Settings	Default setting
Hard Address Enable	**Enabled**—Allows you to enter a value for the FC-AL address. **Disabled**—The device selects and configures an available address when the FC loop is initialized.	Enabled Disabled	Disabled
Hard Address	If hard addressing is enabled, allows you to set the FC-AL hard address.	0–125	0
Loop Retry Count	Not supported with Mac OS X.	N/A	N/A
Frame Size	Determines the size of FC packets. Typically, the initiator and target negotiate the frame size, starting with the largest possible value. For normal operation, set the frame size to the largest value.	512 1024 2048	2048
Device Discovery	Specifies the type of device discovery the adapter performs. **Note:** Device Discovery must be set to Port WWN to enable multiple paths to the EVA controller.	Node WWN Port WWN	Port WWN
Connection Mode	Determines the type of channel connection: **Arbitrated Loop (AL)**—Connects to an arbitrated loop or a fabric loop port (FL_Port) on a switch. **Point-to-Point (PTP)**—Connects to a direct fabric connection, such as an F_port on a switch. **AL Preferred**—Allows the host adapter to select the type of connection, but attempts to connect in AL mode first. **PTP Preferred**—Allows the host adapter to select the type of connection, but attempts to connect in point-to-point mode first.	Arbitrated Loop (AL) Point-to-Point (PTP) AL Preferred PTP Preferred	PTP Preferred
Max LUNs per Target	Specifies the maximum number of LUNs that can be presented to the server from the EVA. **Important:** All channels must have the same setting to ensure that LUNs use all available channels.	1–255	32
Data Rate	Determines the FC transmission rate. When set to **Auto**, the adapter negotiates the rate based on the connected device.	1 Gb/s 2 Gb/s 4 Gb/s 8 Gb/s Auto	Auto

Field	Description	Settings	Default setting
Node Name	Specifies the node world wide name (WWN) assigned to this channel.	N/A	N/A
Port Name	Specifies the port WWN assigned to this channel.	N/A	N/A
Interrupt Coalesce	Specifies how long an interrupt is delayed. The adapter chip delays interrupts to allow multiple interrupts to queue up before interrupting the CPU. This provides less overhead to service the interrupts. However, in the case of a single interrupt, the delivery is delayed.	None Low Medium High	Low

NVRAM buttons

The NVRAM tab has the following buttons:

- **Load**—Imports an NVRAM configuration from a file
- **Save**—Exports the current NVRAM configuration to a file
- **Commit**—Saves the changes to the NVRAM configuration

> **NOTE:**
> You must reboot the system in order for the changes to take effect.

- **Restore**—Restores the NVRAM configuration to the state it was in after the last reboot
- **Defaults**—Sets the NVRAM settings to the default values

> **NOTE:**
> You must click **Commit** and then reboot the system in order for the changes to take effect.

EVA controller

Select an EVA controller from the Device Listing to view information about the controller or to modify the configuration. Figure 6 shows an example of an HSV210 Paths display.
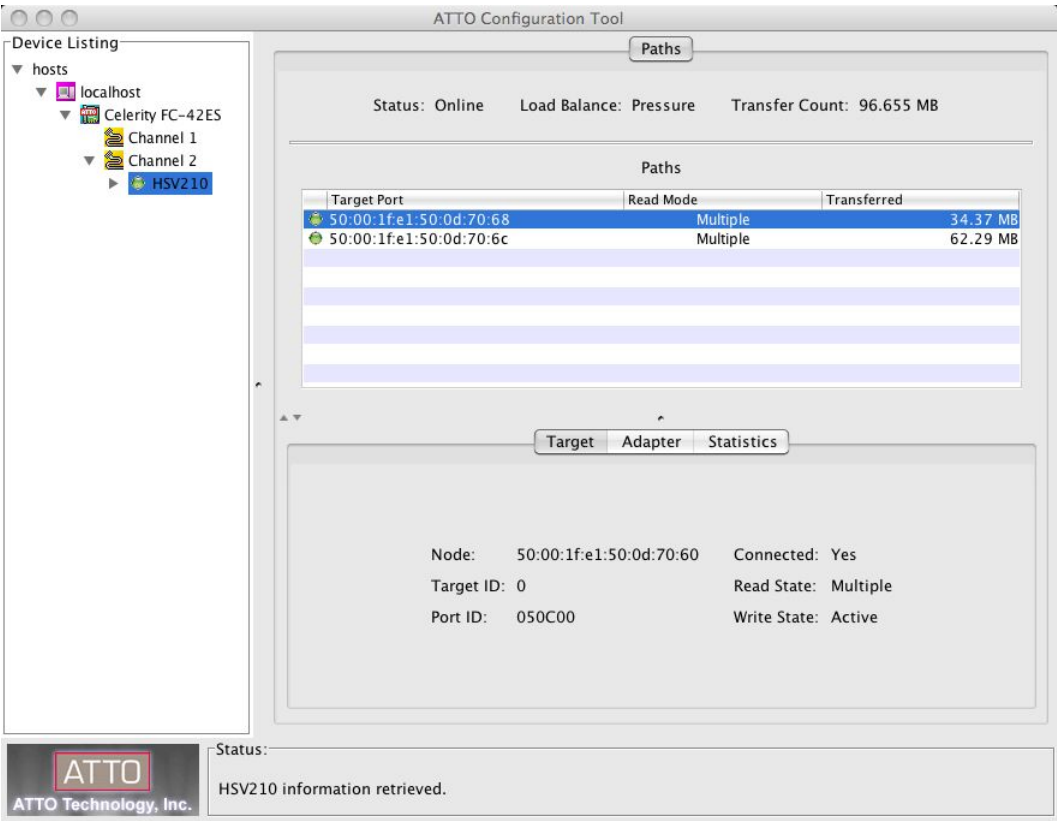

Figure 6 EVA controller—Paths tab

EVA controller path information

Table 6 describes the information displayed on the EVA controller Paths tab.

Table 6 EVA controller path information

Information type	Description
Status	**Online**—All paths are active and available for I/O transactions. **Degraded**—One or more paths are offline; however, I/O can continue on the remaining active paths. **Offline**—No paths are available. I/O and disk connectivity is lost.
Load Balance	**Pressure**—The path with the fewest number of bytes being transferred is selected for I/O. Pressure load balancing is domain based. The first level of path selection is based on the domain (adapter channel) with the fewest number of bytes being transferred. If there are multiple paths to a target on a domain, a second level of selection is used. Pressure load balancing provides the best (or equal) performance of all load balancing policies regardless of storage topology. **Queue Depth**—The path with the fewest outstanding I/O transactions s is selected for I/O. HP recommends that this target-based policy *not* be used in an environment with mixed I/O transfers to many devices. **Round Robin**—The least-used path is selected for I/O. This target-based policy uses the configuration's cumulative I/O count for path selection. For example, if an I/O operation starts and finishes on one path to a dual ported device, the second path is used when the next I/O operation starts. A round robin policy exercises all paths when the application queue depth to a target is 1. In other words, it ensures that all hardware devices are used evenly. The other policies select the same path repeatedly when the queue depth is 1. **Multiple**—Different load balancing policies are set on the LUNs at a lower hierarchal level than the EVA controller device.
Transfer Count	The number of bytes transferred between the system and the EVA controller since the system was booted.
Target Port	The world wide port name (WWPN) of an EVA controller Fibre Channel port. The associated status icon displays green for an active path or red if the path is offline.
Read Mode	**Preferred**—The target port is currently managing a vdisk. **Alternate**—The target port is currently *not* managing a vdisk. **Multiple**—This controller target port is used as a Preferred path and Alternate path by different LUNs. The EVA has a pair of active/active controllers that present all LUNs from each controller's Fibre Channel ports. When you create a vdisk, you can specify which EVA controller will manage the LUN to distribute vdisk I/O workload between the EVA controllers. For optimal performance, the host adapter driver determines which target port manages the vdisk and automatically sets the read mode to Preferred. A target port that is not managing the vdisk is set to Alternate. If a preferred target port fails, I/O reads continue on the alternate path. If a vdisk changes controllers (for example, if a user changes presentation, or a managing controller fails or reboots) the EVA notifies the host adapter and the managing EVA target ports are set to Preferred.
Transferred	The number of bytes transferred between the system and the EVA controller target port since the system was booted.

Setting the load balancing policy on the EVA controller

To set the load balancing policy at the EVA controller level:

1. Right-click a target port on the Paths tab.

   The target port option menu appears (Figure 7).
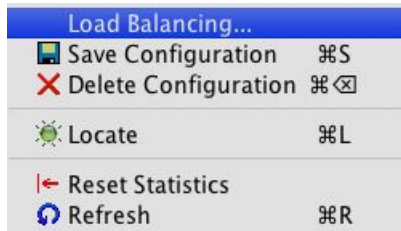
Figure 7 Target port option menu

2. Select **Load Balancing**.

   A selection window opens (Figure 8).
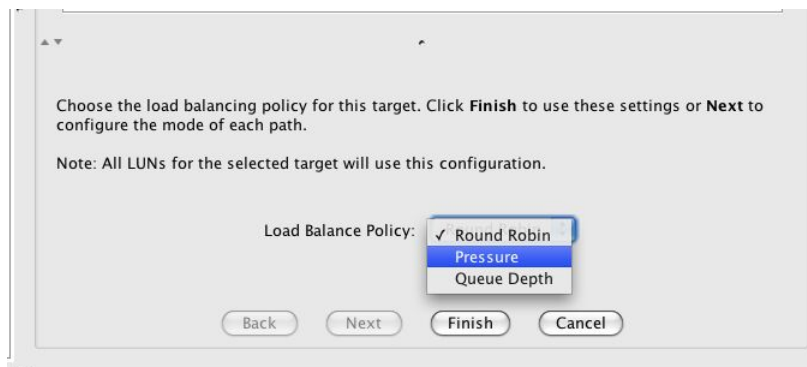
Figure 8 Setting the load balancing policy for an EVA controller

3. Select a load balancing policy from the list, and then click **Finish**.

   The new policy takes effect immediately.

NOTE:

All LUNs for the selected target port use the new policy.

EVA controller target information

The Target tab displays the EVA controller WWNN and status information for the selected target port (Figure 9).
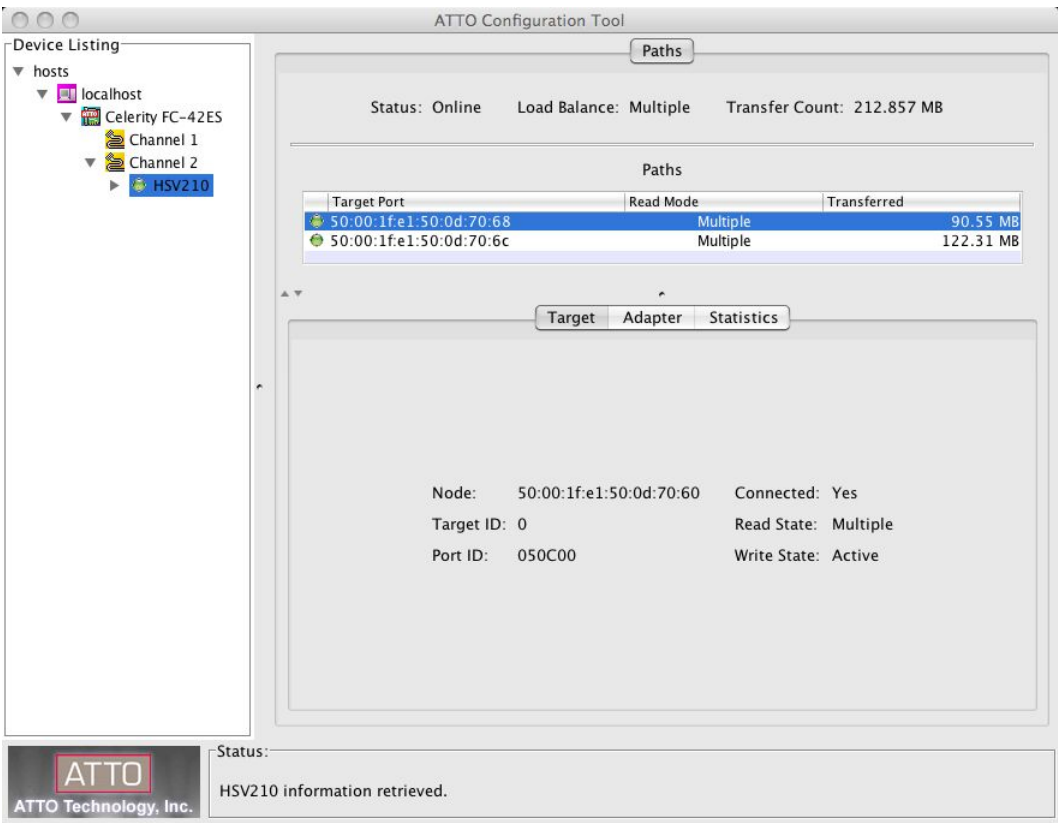
Figure 9 EVA controller—Target tab

EVA controller adapter information

The Adapter tab displays the EVA controller WWPN and adapter status for the selected target port
(Figure 10).
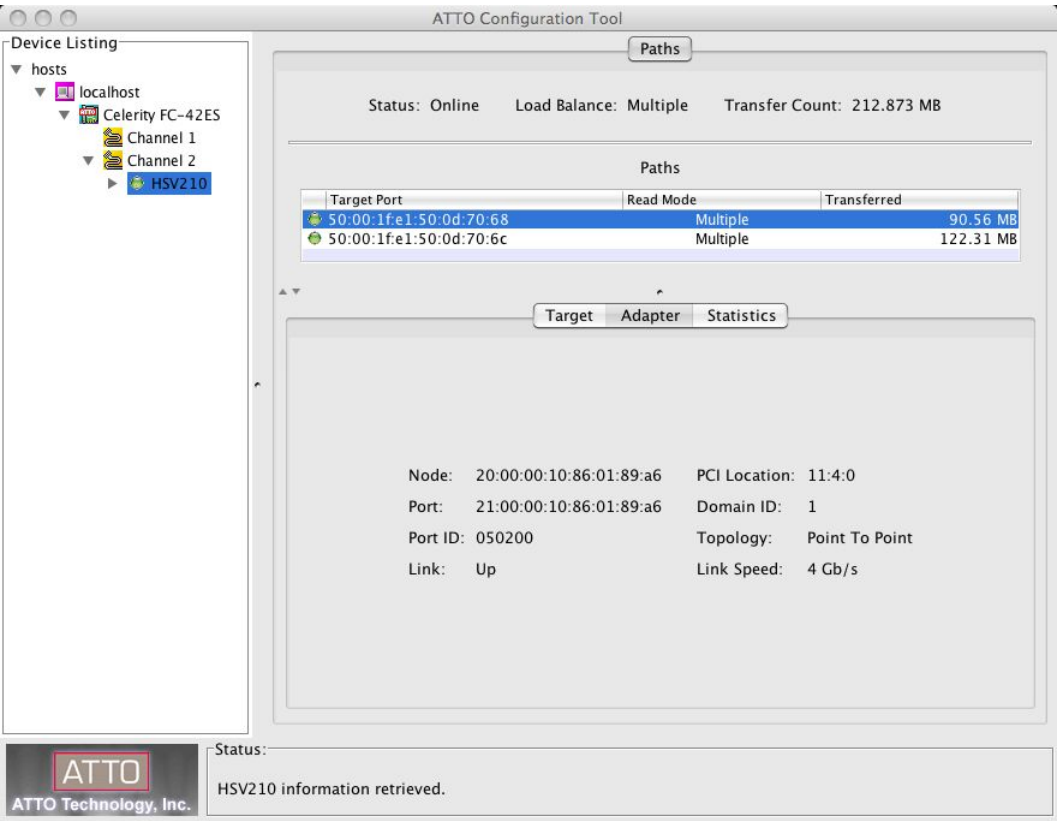
Figure 10 EVA controller—Adapter tab

EVA controller statistics

The Statistics tab displays throughput rates for the selected target port ([Figure 11](#)). Statistics are compiled from the time of system boot or the execution of the `Reset Statistics` command, whichever occurred later.
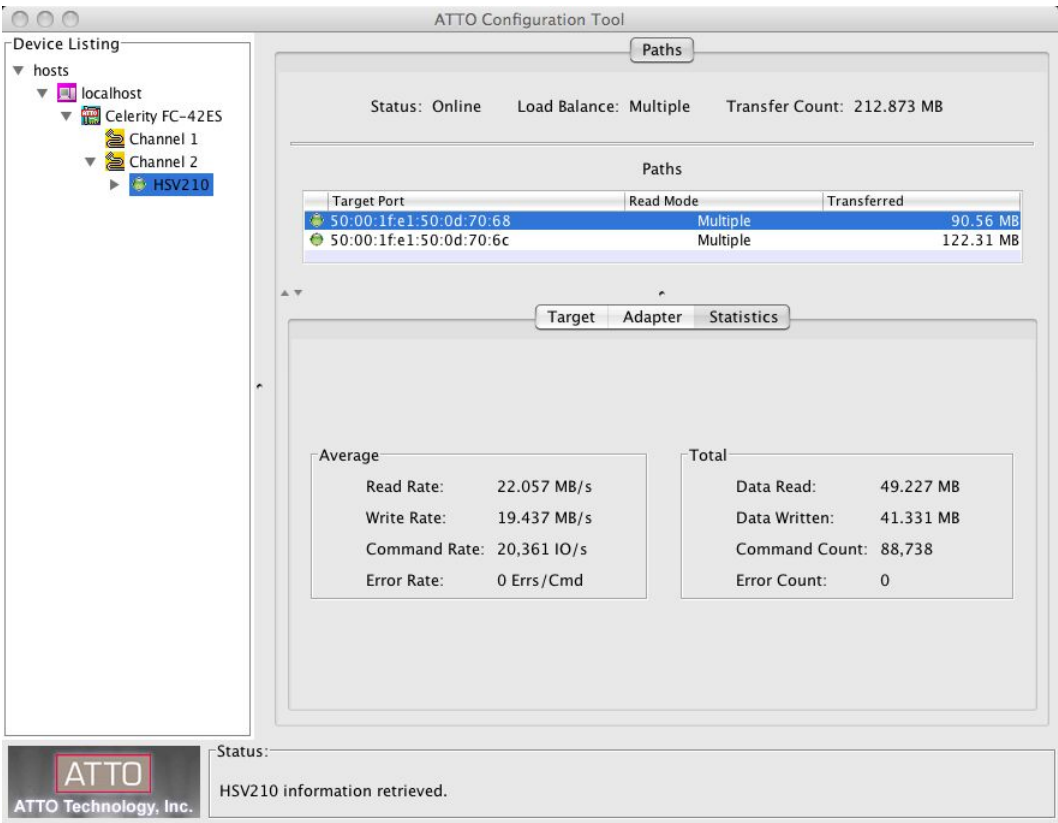
Figure 11 EVA controller—Statistics tab

Resetting EVA controller statistics

To clear the statistics and counters for the selected target port:

1. Right-click a target port on the Paths tab.

    The target port option menu appears (Figure 12).
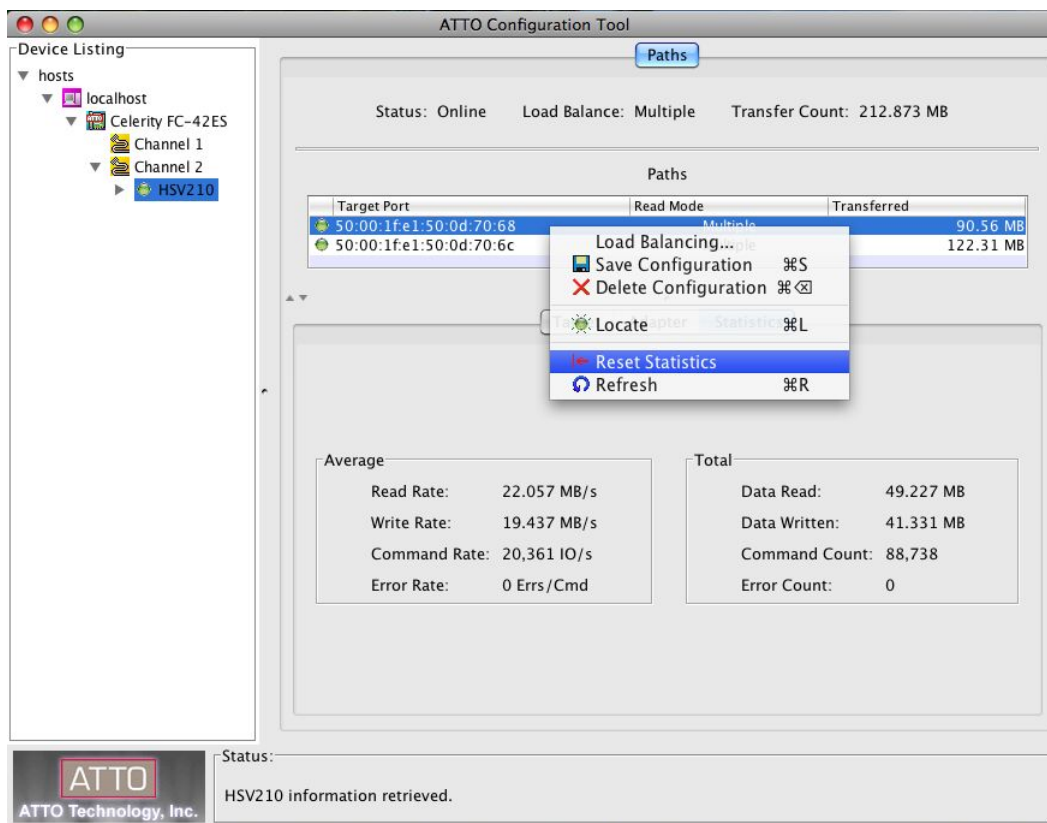
Figure 12 Target port option menu

2. Select **Reset Statistics**.

    A verification window opens.

3. Click **Yes**.

    All statistics and counters for the selected target port and its associated LUNs are reset.

LUN device

Select a LUN from the Device Listing to view or configure information about the LUN. Figure 13 shows an example of a LUN Basic Info display.

Figure 13 LUN—Basic Info tab

LUN path information

Table 7 describes the information displayed on the LUN Paths tab.

Table 7 LUN paths information

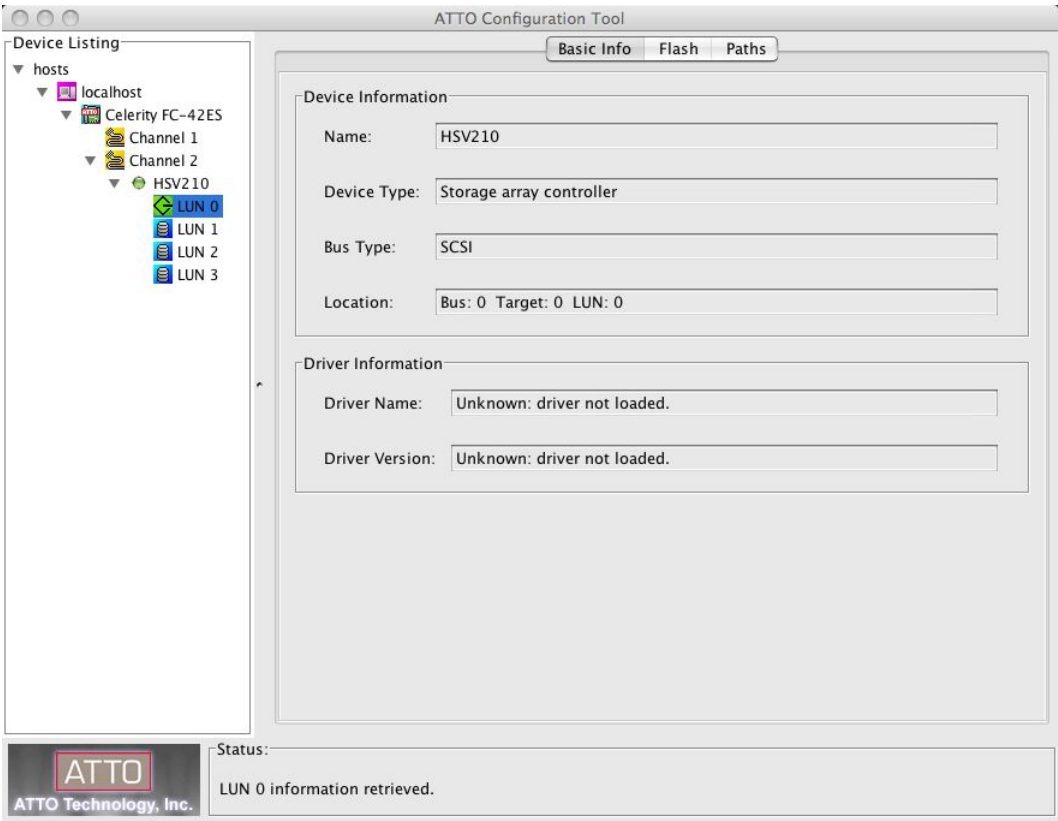| Information type	Description
Status	**Online**—All paths are active and available for I/O. **Degraded**—One or more paths are offline; however, I/O can continue on the remaining active paths. **Offline**—No paths are available. I/O and disk connectivity is lost.
Load Balance	**Pressure**—The path with the fewest number of bytes being transferred is selected for I/O. Pressure load balancing is domain based. The first level of path selection is based on the domain (adapter channel) with the fewest number of bytes being transferred. If there are multiple paths to a target on a domain, a second level of selection is used. Pressure load balancing provides the best (or equal) performance of all load balancing policies regardless of storage topology. **Queue Depth**—The path with the fewest outstanding I/O transactions is selected for I/O. HP recommends that this target based policy *not* be used in an environment with mixed I/O transfers to many devices. **Round Robin**—The least used path is selected for I/O. This target based policy uses the configuration's cumulative I/O count for path selection. For example, if an I/O operation starts and finishes on one path to a dual ported device, the second path is used when the next I/O operation starts. The round robin policy exercises all paths when the application queue depth to a target is 1. In other words, it ensures that all hardware devices are used evenly. The other policies select the same path repeatedly when the queue depth is 1.
Transfer Count	The number of bytes transferred between the system and the LUN since the system was booted.
Target Port	The WWPN of an EVA controller Fibre Channel port. The associated status icon displays green for an active path or red if the path is offline.
Read Mode	**Preferred**—The target port is currently managing a vdisk. **Alternate**—The target port is currently *not* managing a vdisk. The EVA has a pair of active/active controllers that present all LUNs from each controller's respective Fibre Channel ports. When you create a vdisk, you can specify which EVA controller will manage the LUN to distribute vdisk I/O workload between the EVA controllers. For optimal performance, the host adapter driver determines which target port manages the vdisk and automatically sets the read mode to Preferred. A target port that is not managing the vdisk is set to Alternate. Read requests are serviced on the preferred path only. Write operations use both preferred and alternate paths. If a preferred target port fails, I/O reads continue on the alternate path. If a vdisk changes controllers (for example, if a user changes presentation, or a managing controller fails or reboots) the EVA notifies the host adapter and the managing EVA target ports are set to Preferred.
Transferred	The number of bytes transferred between the system and the LUN target port since the system was booted.

Setting the load balancing policy on the LUN

To change the load balancing policy at the LUN target level:

1. Right-click a target port on the Paths tab.

   The target port option menu appears (Figure 14).
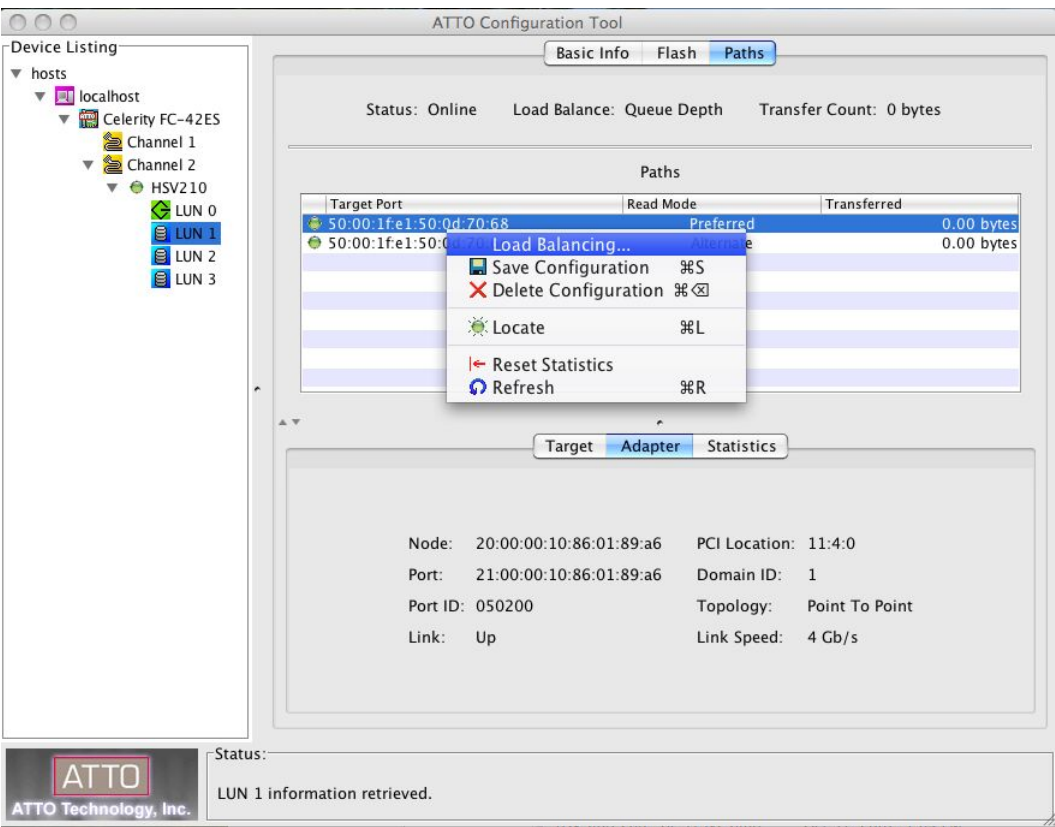
Figure 14 Target port option menu

2. Select **Load Balancing**.

   A selection window opens (Figure 15).
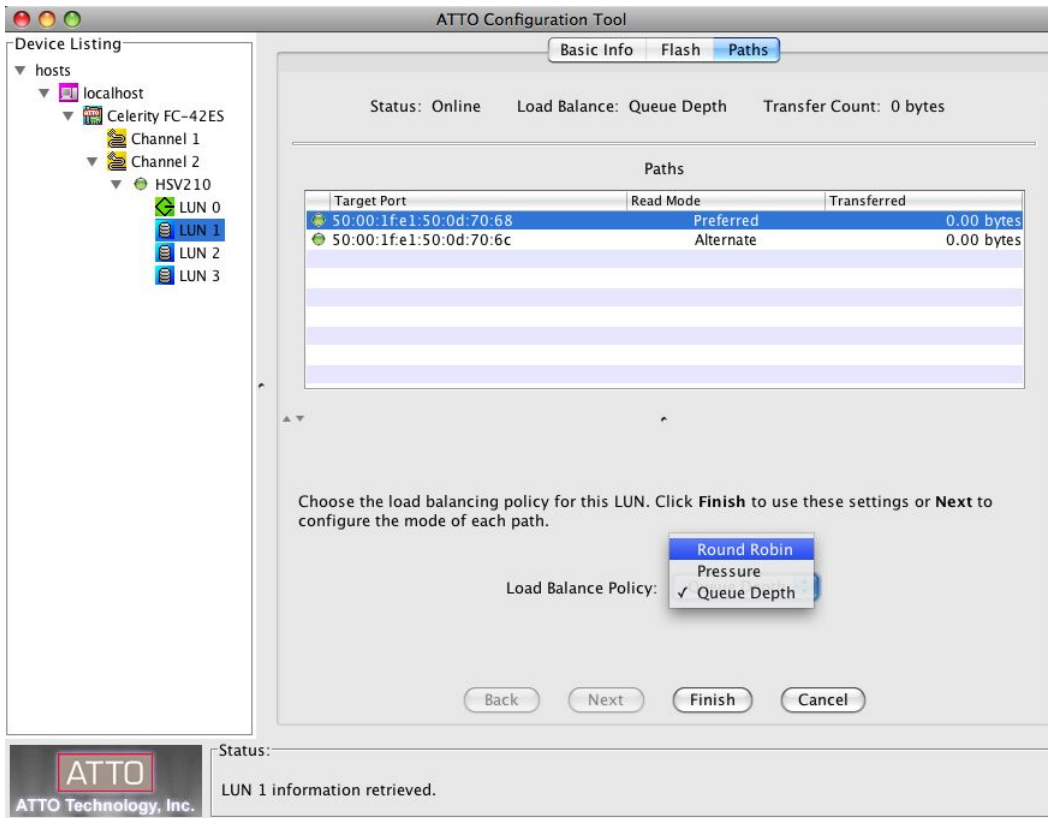
Figure 15 Setting the load balancing policy for a LUN

3. Select a load balancing policy from the list, and then click **Finish**.

   The new policy takes effect immediately.

📝 NOTE:

Setting the load balancing policy at the EVA controller level overrides individual LUN load balancing policy settings.

LUN target information

The target tab displays the WWNN and status information for the selected target port (Figure 16).
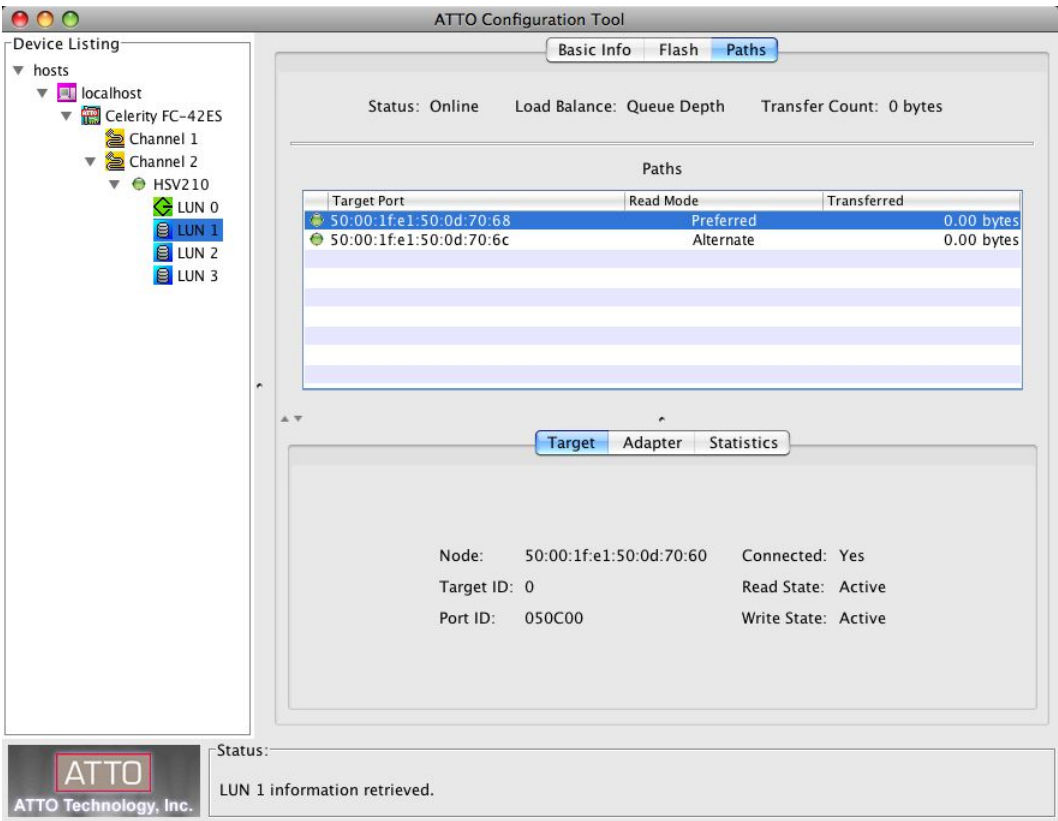
Figure 16 LUN—Target tab

LUN adapter information

The Adapter tab displays the WWPN and adapter status for the selected target port (Figure 17).
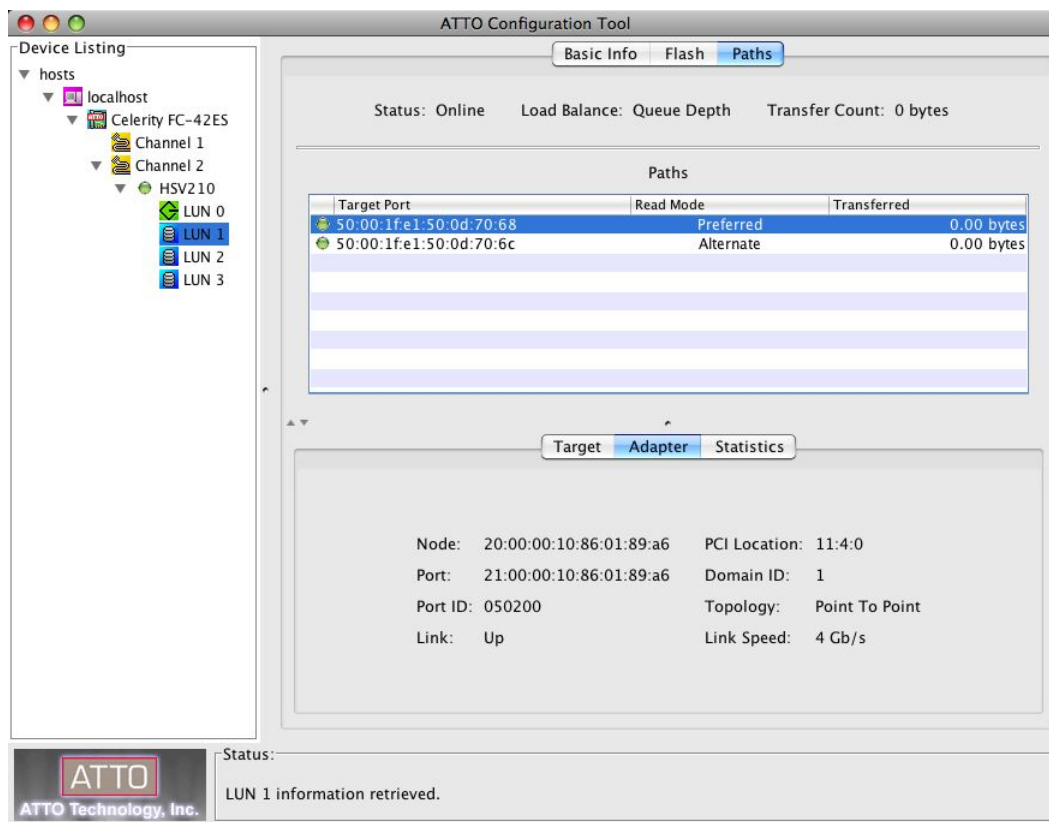
Figure 17 LUN—Adapter tab

LUN statistics

The Statistics tab displays throughput rates for the selected target port (Figure 18). The statistics are compiled from the time of the system boot or the execution of the `Reset Statistics` command, whichever occurred later.
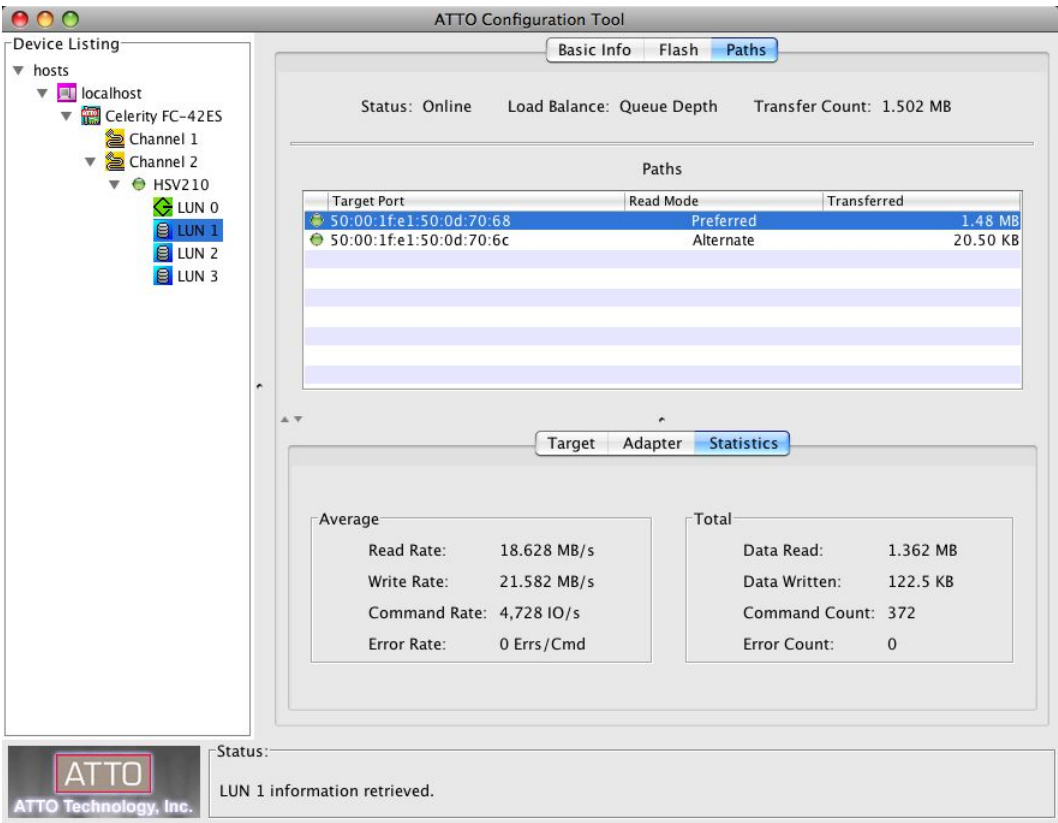
Figure 18 LUN—Statistics tab

Resetting LUN statistics

To clear the statistics and counters for the selected LUN:

1. Right-click a target port on the Paths tab.

   The target port option menu appears (Figure 19).
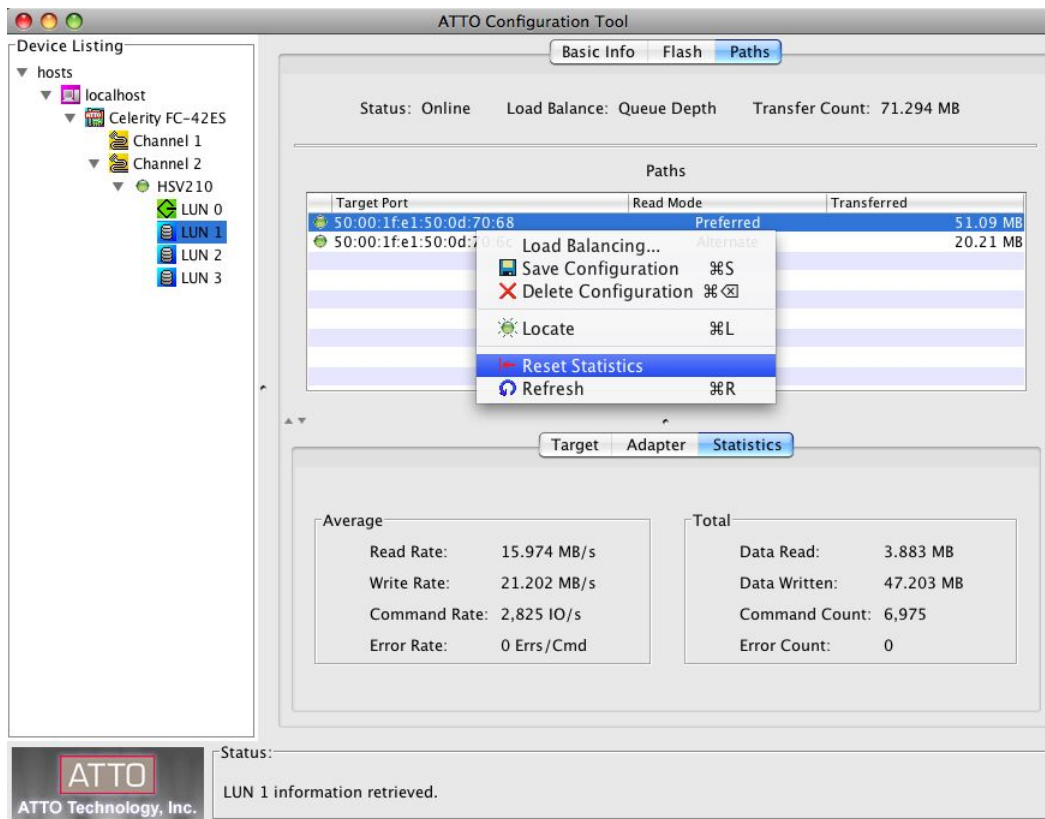
Figure 19 Target port option menu

2. Select **Reset Statistics**.

   A verification window opens.

3. Click **Yes**.

   All statistics and counters for the selected EVA controller and its associated LUNs are reset.

Other ATTO Configuration Tool options

The ATTO Configuration Tool offers other options that you can use to manage your configuration. You can access the target port option menu (Figure 20) for an EVA controller or LUN by right-clicking a target port on the Paths tab.

Table 8 describes the menu options.
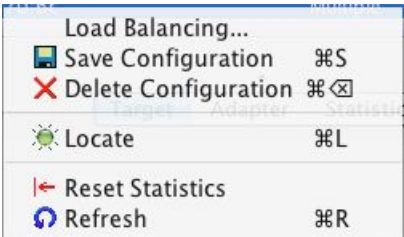
Figure 20 Target port options menu

Table 8 Target port menu options

| Option	Description
Load Balancing	Configures path utilization. For more information, see "Setting the load balancing policy on the EVA controller" on page 28 or "Setting the load balancing policy on the LUN" on page 35.
Save Configuration	Stores a snapshot of the current configuration. Use the saved configuration to re-create the setup after a reboot.
Delete Configuration	Deletes the stored configuration and restores the default values.
Locate	Identifies the path channel by causing the link light on the host adapter to blink.
Reset Statistics	Resets all statistics and counters for the selected EVA controller and its corresponding LUNs. For more information, see "Resetting EVA controller statistics " on page 32 or "Resetting LUN statistics " on page 40.
Refresh	Refreshes state and statistics information for all paths. **NOTE:** The ATTO Configuration Tool performs an automatic refresh every 10 seconds.

A Multipath configuration

The ATTO Celerity Fibre Channel host adapter driver supports redundant or multiple paths between the host system and the EVA storage system. Proper setup of redundant paths ensures high availability of target disks. In an ideal configuration, each path uses separate Fibre Channel host adapters and infrastructure hardware (such as cables and switches). This ensures no single point of failure (NSPOF). However, the ATTO driver supports multiple paths on configurations with single, dual, or quad card configurations.

Regardless of the complexity of your configuration, there are different ways in which you can configure paths between the Mac OS X host and the EVA storage system. How you set up your configuration depends on system and SAN resources.

By default, multipath is enabled when the driver is installed on the system. To configure a multipath environment:

1. Create a Mac OS X host entry in HP Command View EVA to recognize the WWPNs from the host system.

2. Present a vdisk to the host system.

3. Use the ATTO Configuration Tool to monitor (and optionally configure) paths.

Multipath configuration guidelines

When planning your SAN, consider the following guidelines:

- HP recommends that you configure Fibre Channel zoning for a single host adapter port WWPN with a single EVA port WWPN.
- A single host adapter port WWPN zoned with multiple EVA port WWPNs to the same EVA storage system is supported.
- A single host adapter port WWPN zoned with multiple EVA storage systems is supported.
- A single host adapter port supports I/O load balancing.
- Multiple host adapter ports support I/O load balancing.
- I/O load balancing can span multiple host adapters.

Fibre Channel zoning for multipath environments

This section describes how to configure zoning for a Mac OS X host with multipath connectivity to two host adapter ports and two EVA ports. The exact procedure can vary, depending on your configuration.

1. Create a zone that contains:

  - The first host adapter port WWPN
  - An EVA port WWPN from the first controller

2. Create another zone that contains:
   - The second host adapter port WWPN
   - An EVA port WWPN from the second controller
3. Add the zones to the switch configuration.
4. Enable or re-enable the configuration to add the zones to the fabric's current configuration.

Table 9 provides sample values for a single host zone.

Table 9 Single host zone example

Zone	Host adapter port WWPN	EVA port WWPN
EVA_Port_1_Zone	21:00...a2:cb	50:00....20:7d
EVA_Port_2_Zone	21:00...2a:ca	50:00....20:78

NOTE:
Additional hosts can be added to each zone.

Table 10 provides sample values for a dual host zone.

Table 10 Dual host zone example

Zone	Host adapter port WWPN	EVA port WWPN
EVA_Port_1_Zone	21:00...a2:cb (Host 1) 21:00...54:20 (Host 2)	50:00....20:7d
EVA_Port_2_Zone	21:00...a2:ca (Host 1) 21:00...54:21(Host 2)	50:00....20:78

Using HP Command View EVA for multipath configuration

This section describes using the HP Command View EVA management tool to configure a multipath environment.

Creating a host entry for a multipath Mac OS X host

To create an HP Command View EVA host entry for a multipath Mac OS X host:

1. Log on to HP Command View EVA.
2. In the Hosts folder on the Storage System pane, click **Add host**.

   By default, the host type is `Fibre Channel`.
3. Enter the name of the host in the Name box.

   HP Command View EVA displays this name in the Hosts folder.
4. Select the host adapter port WWPN from the Port World Wide Name list.

5. For a Mac OS X host, select the operating system type.
   - For XCS 6.100 or later, select **Custom** from the Operating System Type list, and then enter **00000002024000A8** as the Custom type.
   - For XCS 09003000 or later, select **Apple Mac OS X** from the Operating System Type list.
6. Click **Add host**.
7. In the Hosts folder, select the host you created in Step 3.
8. Click the **Ports** tab (Figure 21).
9. Click **Add port**.
10. Select the second host adapter port WWPN from the Port World Wide Name list.
11. Click **Add port**.
12. Click **OK**.
13. To add another port, repeat Step 9 through Step 12.
14. Verify that the HP Command View EVA OS X host entry contains the WWPN from each ATTO host adapter port on the system.
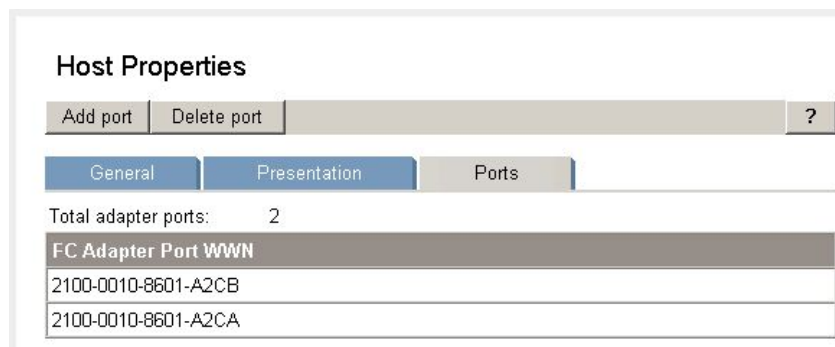

Figure 21 Host Properties—Ports tab

Creating and presenting a LUN to a Mac OS X host

To create and present a LUN to a Mac OS X host:

1. Log on to HP Command View EVA.
2. In the Virtual Disks folder on the Storage System pane, click **Create Vdisk**.
3. Enter a name for the vdisk in the Name box.
4. Enter the size of the vdisk in the Size box.
5. Select a group from the Disk group list.
6. Select a redundancy (RAID) level.
7. Select the Mac OS X host entry name from the Present to host list.
8. Click **Create Vdisk**.
9. Verify vdisk presentation to the Mac OS X system:
   1. Select the Mac OS X host entry.
   2. Under Host Properties, click the **Presentation** tab.
   3. Verify that the vdisk appears (Figure 22).
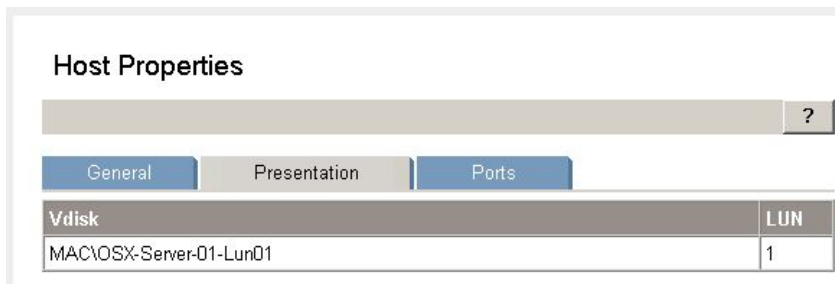
Figure 22 Host Properties—Presentation tab

> **NOTE:**
> Wait a few minutes to verify that the LUN is visible to the Mac OS X file system. Depending on the version of Mac OS X, a host reboot might be necessary.

When the LUN appears to the host you can use Mac OS X disk utilities to perform normal block-level partitioning of the LUN.

Using the ATTO Configuration Tool in a multipath environment

The ATTO Fibre Channel host adapter driver automatically determines the number of paths to a LUN presented by the EVA storage system and uses the pressure load balancing policy by default.

The ATTO Configuration Tool is available for download on the ATTO Support Product Information website:

https://www.attotech.com/hp/fibre_channel_eva.html

For more information, see Chapter 3 on page 19.

Multipath configuration examples

This section describes typical multipath configurations that follow installation and setup guidelines.

One host adapter port connected to multiple EVA controllers

The configuration shown in Figure 23 provides active/active path failover between EVA controller ports only.
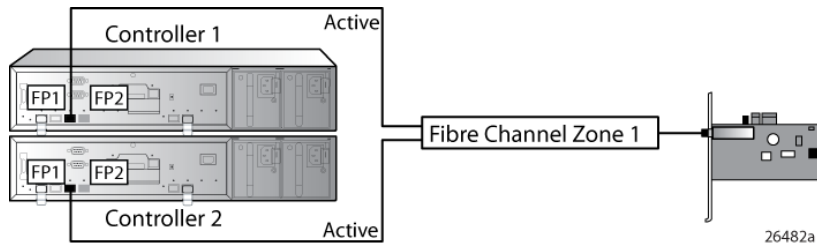
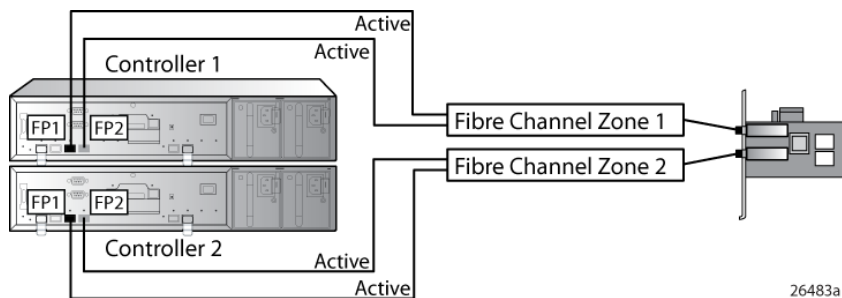**Figure 23 One host adapter port connected to multiple EVA controllers**

> **NOTE:**
> This configuration supports dual and quad port host adapters.

Two host adapter ports connected to multiple EVA controllers

The configuration shown in Figure 24 provides active/active path failover between EVA controller ports and I/O load balancing between two host adapter ports.

Figure 24 Two host adapter ports connected to multiple EVA controllers

> **NOTE:**
> This configuration supports single and quad port host adapters.

Four host adapter ports connected to multiple EVA controllers

The configuration shown in Figure 25 provides active/active path failover between EVA controller ports and I/O load balancing between four host adapter ports.

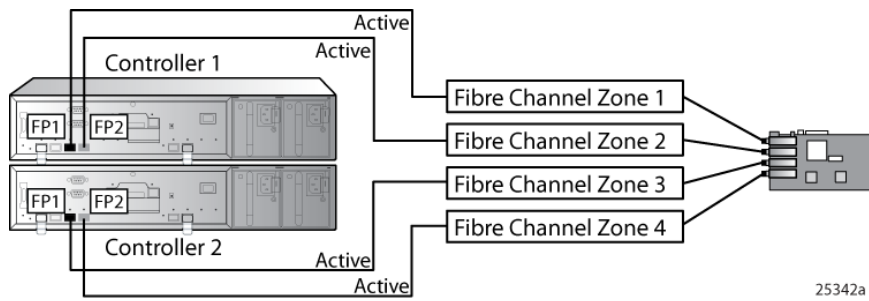**Figure 25 Four host adapter ports connected to multiple EVA controllers**

📝 **NOTE:**

This configuration supports single and dual port host adapters.

B EVA storage system software

HP offers array-based replication and local mirroring software for EVA storage systems. You can make point-in-time copies, or snapshots, of your data for disaster recovery, testing, application development, and reporting.

Two EVA storage system software solutions support Mac OS X:

- HP StorageWorks Continuous Access EVA
- HP StorageWorks Business Copy EVA

Using HP Continuous Access EVA with Mac OS X

HP Continuous Access EVA is a Fibre Channel storage controller-based data replication solution that meets disaster-tolerance requirements and supports EVA storage systems.

Features include:

- In-order synchronous or asynchronous remote replication (remote mirroring)
- Automated failover support
- Normal and failsafe data protection modes of operation
- Dual-redundant controller operation for increased fault tolerance
- Intersite link suspend and resume operations
- Merge or write-history log in write order

Overview

Data replication is performed in the EVA controller and is transparent to the host, reducing the number of host cycles required to perform data mirroring. Unlike a fabric-based or host-based solution, HP Continuous Access EVA dedicates its resources to managing the replication process between arrays, with minimal impact on applications, other data, and other devices in the SAN.

Figure 26 shows a sample configuration.
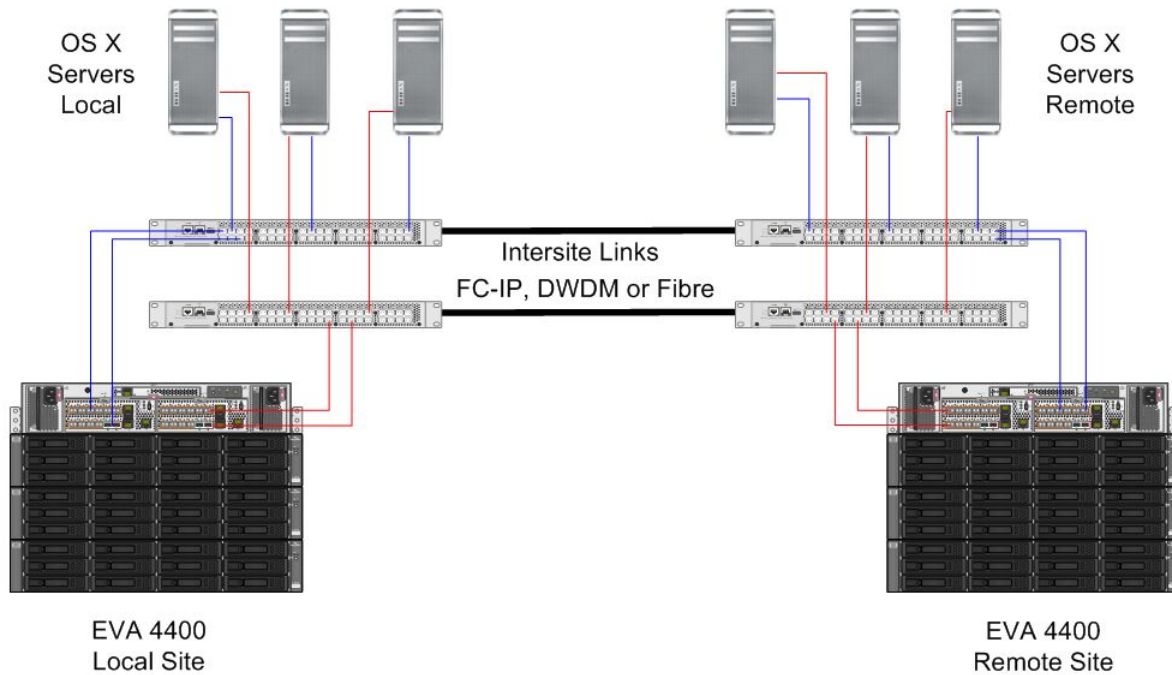
Figure 26 HP Continuous Access EVA with Mac OS X

HP Continuous Access EVA copies data online and in real time to a remote EVA via synchronous or asynchronous replication through a local or extended SAN. Data replication can be bidirectional, meaning that a storage system can be both a source and a destination. A LUN can be replicated between two storage systems in one direction only. Write I/O is sent to the source, and then HP Continuous Access EVA replicates the I/O to the destination.

A properly configured HP Continuous Access EVA environment is a complete, disaster-tolerant storage solution that guarantees data integrity in the event of a storage system or site failure. For more information, see the HP StorageWorks Continuous Access EVA Software website:

http://h18006.www1.hp.com/products/storage/software/conaccesseva/index.html

Using HP Business Copy EVA with Mac OS X

HP Business Copy EVA is the local replication component of the HP Enterprise Virtual Array.

Features include:

- The ability to create point-in-time copies called snapshots, snapclones, and mirrorclones of vdisks
- Adjustable snapshot, snapclone, and mirrorclone properties; such as redundancy (RAID) level, read cache, and write protection
- The ability to present snapshots, snapclones, and mirrorclones as disks to hosts
- Immediate host I/O to snapshots and snapclones
- Instant restore of content of a vdisk using a snapshot, snapclone, or mirrorclone

Overview

HP Business Copy EVA shares an integrated management interface with HP Continuous Access EVA. HP Business Copy EVA provides features, replication licenses, and interfaces for local replication of EVAs. Local replication is a licensed feature of HP StorageWorks that allows you to quickly create local copies of your data using the array's replication engine. These copies are known as mirrorclones, snapclones and snapshots.

Supported features on a Mac OS X host system

On a host system running Mac OS X, the following HP Business Copy EVA features are supported:

- Snapshots of LUNs presented to hosts
- Snapclones (normal or three-phase) of LUNs presented to host systems
- Instant restore from snapclone to original source
- The ability of host systems to access and write to EVA snapshots and snapclones
- Automatic scheduling of snapshot creation using HP Command View EVA, HP StorageWorks Storage System Scripting Utility (SSSU), or HP StorageWorks Replication Solutions Manager
- Manual snapshot creation using HP Command View EVA, HP SSSU, or HP Replication Solutions Manager
- Use of the CLI to enter replication commands from host systems

Restrictions with a Mac OS X system

NOTE:

In order to use advanced replication features for LUNs presented to hosts, you must have a replication host agent on the operating system. Currently, there is no Mac OS X replication host agent available.

On a host system running Mac OS X, the following HP Business Copy EVA features are *not* supported:

- Using the host agent to mount or unmount LUNs
  You must mount and unmount LUNs manually.

- Accessing the Mac OS X host view of the storage system
- Deploying host agents to launch a script on the Mac OS X host

For more information, see the HP StorageWorks Business Copy EVA Software website:

http://h18006.www1.hp.com/products/storage/software/bizcopyeva/index.html

C Troubleshooting the Celerity FC host adapter

This appendix presents troubleshooting techniques that you can use to identify and resolve issues with the Celerity FC host adapter. It describes the following topics:

- Troubleshooting tools
- Troubleshooting examples
- Escalation checklist

Troubleshooting tools

This section describes the following troubleshooting tools:

- Apple System Profiler
- ATTOCelerityFCLog
- ATTO Celerity IORegistry

There are other utilities you can use with Mac OS X to diagnose a problem. You should be familiar with the applications listed in Table 11.

Table 11 Mac OS X applications

Mac OS X application	Use
TextEdit	Edit text
Disk Utility	Repair and format Mac OS X disks
Console	View application logs in real-time
Finder	View standard files
Terminal	Send UNIX-based commands

Apple System Profiler

Apple System Profiler (ASP) is a utility that displays information such as processor type, RAM type, OS version, logs, driver versions, and application versions. You can output ASP data to a file for use during support escalation. Celerity FC host adapter information includes details about the EVA storage system and LUN, and is available in the Fibre Channel hardware section.

Figure 27 shows sample ASP output.
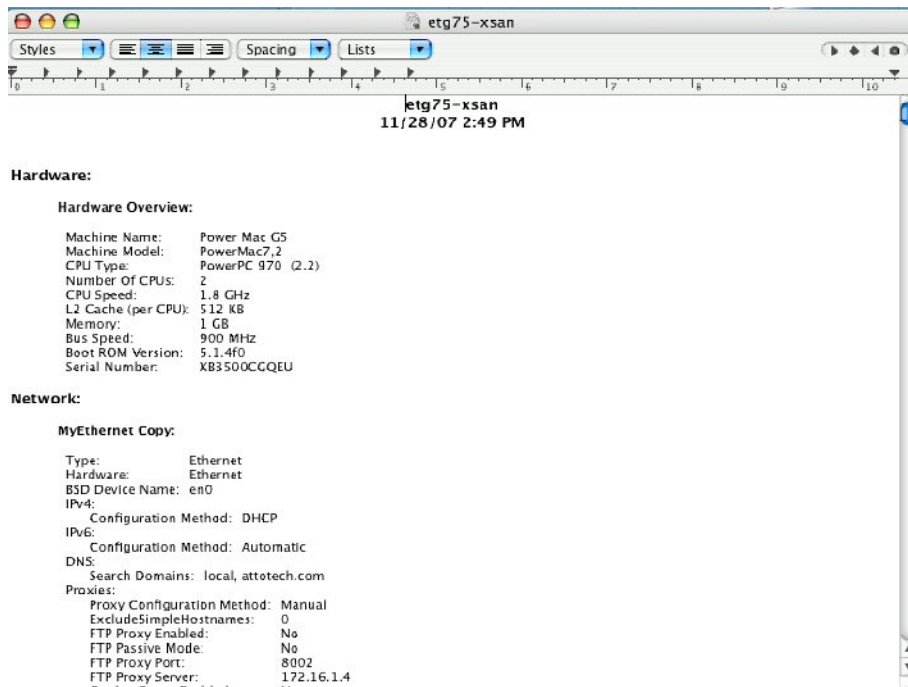
Figure 27 Sample ASP output

To view ASP output:

1. Click the Apple icon in the top left corner of the screen.

2. Click **More info**.

3. Select **File > Save as** and enter the file name and directory in which to save the file.

ATTOCelerityFCLog utility

The Celerity FC host adapter driver does not use the system log to communicate driver events because it has limited resources and events are easily lost. Instead, the driver logs events internally; you can retrieve them using the ATTOCelerityFCLog utility.

It is difficult to predict the number of events, but the driver's internal event log should be large enough to hold all events from the time the driver is loaded until the time ATTOCelerityFCLog is run. If the event log becomes full, the driver continues to log events, overwriting the earliest events with the most recent events. If event data is lost, ATTOCelerityFCLog displays `...Lost X bytes...`, where *X* is the number of bytes lost.

The ATTOCelerityFCLog utility displays events as they are logged by the driver. You can set the utility as a startup item to always retrieve events in the background, but this can cause a slight performance degradation.

When events are retrieved and displayed, they cannot be redisplayed, even if they are not overwritten by subsequent events. If you want to save events for future reference, save the Terminal output or use standard redirection when starting ATTOCelerityFCLog to save the output to a file.

Each event begins with a channel identifier, Channel *X.Y.Z*, where *X* is the PCI bus number, *Y* is the PCI device number, and *Z* is the PCI function number. Driver initialization messages can be logged before this information is available.

You can specify the types of events that are logged using the `-e System NVRAM` option. Each bit in the mask corresponds to a group of related messages.

0x01	Log fatal events that prohibit the driver from loading normally
0x02	Log events associated with the Fibre Channel loop
0x04	Log SCSI request errors
0x08	Log events reported by the adapter controller chip
0x10	Log port login/logout events
0x20	Log RSCN events
0x40	Log resource usage failures
0x80	Log informational messages

System NVRAM options

You can use the system NVRAM environment variable `atto-args-celerityfc` to configure the Celerity FC host adapter driver. The options are:

`-e` `mask`	Specify the hexadecimal mask for event logging.
`-p`	View the current options in Mac OS X.
[blank]	Leave the options parameter blank to clear the options.

Consider the following:

- These options are stored in system NVRAM; therefore, they persist between reboots and shutdowns.
- To remove options, reset the system NVRAM by pressing **Command+Option+P+R**.
- To view the current options in Mac OS X, open a Terminal session and enter the `nvram -p` command.

Setting the options from the Open Firmware User Interface (PowerPC systems only)

To set the system NVRAM options from a Terminal session:

1. Boot to the Open Firmware User Interface by pressing **Command+Option+O+F** while booting.

2. At the prompt, enter `setenv atto-args-celerityfc="`*`options`*`"`.

3. At the prompt, enter the `mac-boot` command.

Setting the options in Mac OS X

To set the system NVRAM options from a Terminal session:

1. Enter `sudo nvram atto-args-celerityfc="`*`options`*`"`

   If you are not the root user, you will be prompted for an administrator password.

2. Reboot the system for the changes to take effect.

Enabling debug output

To enable debug output from a Terminal session:

1. Enter the `sudo nvram atto-args-celerityfc="-e 0xff"` command.

   If you are not the root user, you will be prompted for an administrator password.

2. Reboot the system for the changes to take effect.

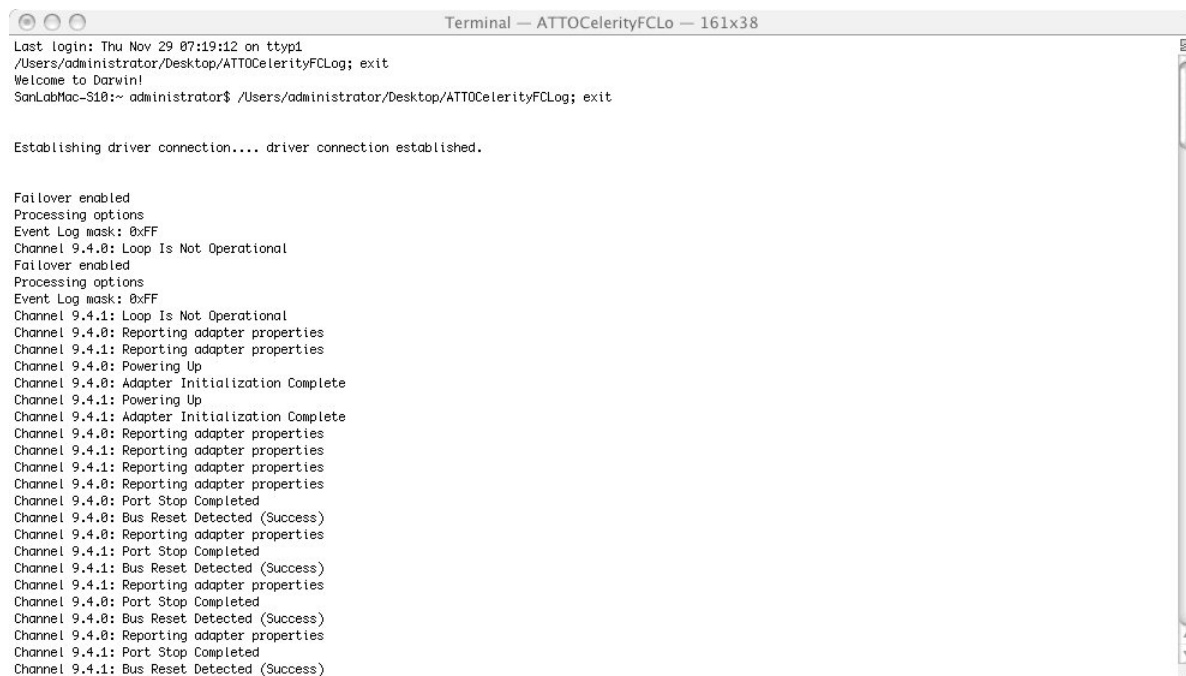3. Enter the `nvram -p` command to verify the change.

Collecting debug output

The Celerity FC host adapter driver does not use the system log to communicate driver events because it has limited resources. To ensure that you can view events, the driver logs them internally.

You can retrieve logs using the ATTOCelerityFCLog utility, available in `/System/Library/Extensions/ATTOCelerityFCUtils` (Figure 28).

To retrieve a log for support analysis:

1. After reproducing the issue, launch `ATTOCelerityFCLog`.

2. Copy and paste the output into a TextEdit file.

3. Save the file and forward it to the designated support channel.

```
Last login: Thu Nov 29 07:19:12 on ttyp1
/Users/administrator/Desktop/ATTOCelerityFCLog; exit
Welcome to Darwin!
SanLabMac-S10:~ administrator$ /Users/administrator/Desktop/ATTOCelerityFCLog; exit


Establishing driver connection.... driver connection established.


Failover enabled
Processing options
Event Log mask: 0xFF
Channel 9.4.0: Loop Is Not Operational
Failover enabled
Processing options
Event Log mask: 0xFF
Channel 9.4.1: Loop Is Not Operational
Channel 9.4.0: Reporting adapter properties
Channel 9.4.1: Reporting adapter properties
Channel 9.4.0: Powering Up
Channel 9.4.0: Adapter Initialization Complete
Channel 9.4.1: Powering Up
Channel 9.4.1: Adapter Initialization Complete
Channel 9.4.0: Reporting adapter properties
Channel 9.4.1: Reporting adapter properties
Channel 9.4.1: Reporting adapter properties
Channel 9.4.0: Reporting adapter properties
Channel 9.4.0: Port Stop Completed
Channel 9.4.0: Bus Reset Detected (Success)
Channel 9.4.0: Reporting adapter properties
Channel 9.4.1: Port Stop Completed
Channel 9.4.1: Bus Reset Detected (Success)
Channel 9.4.1: Reporting adapter properties
Channel 9.4.0: Port Stop Completed
Channel 9.4.0: Bus Reset Detected (Success)
Channel 9.4.0: Reporting adapter properties
Channel 9.4.1: Port Stop Completed
Channel 9.4.1: Bus Reset Detected (Success)
```

Figure 28 ATTOCelerityFCLog example

ATTO Celerity IORegistry

The IORegistry provides useful troubleshooting information about installed devices (Figure 29).

To retrieve an IORegistry report for support analysis, enter `IOREG.command` from `/System/Library/Extensions/ATTOCelerityFCUtils`.
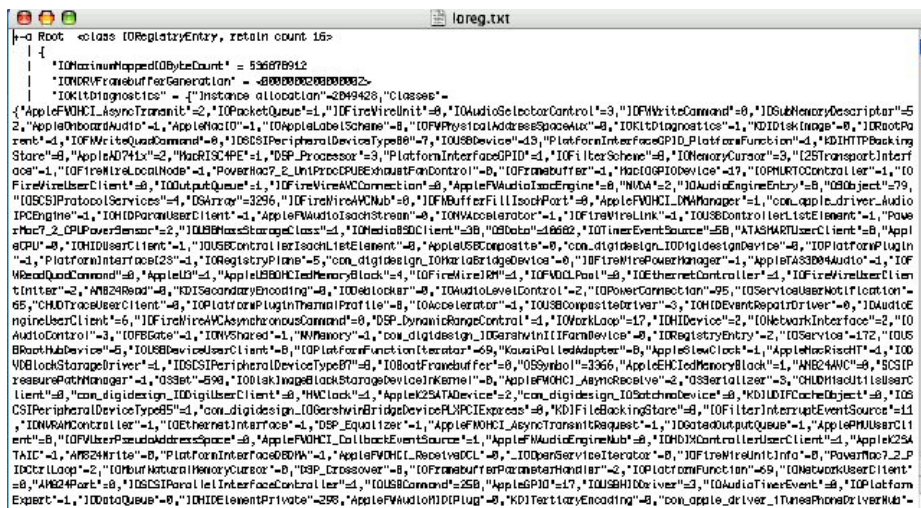
Figure 29 IORegistry report

Removing the Celerity FC host adapter driver and utilities

To remove the Celerity FC host adapter driver and utilities, use the `Uninstall` command script in `/System/Library/Extensions/ATTOCelerityFCUtils`.

Troubleshooting examples

This section describes problems and provides recommended steps for resolution. Perform the steps in the order presented.

Celerity FC host adapter does not appear in ASP

Problem: The Celerity FC host adapter is installed but is not listed in the ASP output.

To troubleshoot this problem, perform the following steps:

1. Ensure that the host adapter is seated properly by powering down the computer and reseating the host adapter.
2. Verify the host adapter driver installation.
3. Move the host adapter to a different slot.
4. If the problem persists with the host adapter, replace it with a new host adapter.
5. Ensure that the PCIe adapter is installed in a slot configured as x4 or x8.
6. Remove any nonessential PCI cards to determine if there is a PCI bus conflict.
7. Disconnect all Fibre Channel devices from the host adapter and reboot the computer.
   - If this corrects the problem, check the Fibre Channel cable, SFPs, or Fibre Channel target devices as described in "Fibre Channel device is faulty" on page 58.
   - If the computer does not boot, install the host adapter in a different computer.
   - If the host adapter works in the new computer, update the flash on the host adapter as described in the *ATTO Celerity 4-Gb and 8-Gb Host Adapter Installation & Operation Manual*, and then move the host adapter back to the original computer.

8. If the original configuration still fails, contact HP and report this as a possible interoperability issue between the host adapter and the computer.

ASP does not detect any of the Fibre Channel devices

Problem: The ASP recognizes the Celerity FC host adapter but does not detect any of the connected Fibre Channel devices.

To troubleshoot this problem, perform the following steps:

1. Verify that the Fibre Channel devices are powered on.

2. Verify the cable integrity:

- Check the cable connections.
- Inspect the SFPs for physical damage.
- Replace the SFPs if necessary.
- Inspect the cable ends for dirt or abrasions, which can affect communication.

3. Verify zoning, if any, including the WWPNs of the host adapter port and the EVA ports.

4. For HP Command View EVA:

- Verify that the host entry for the server has been created and the host adapter WWPNs are correct.
- Verify that the EVA LUNs have been presented to the EVA host entry.

5. Boot Mac OS X and use the ATTO Configuration Tool to set the connection mode to **PTP** or **Loop** (to match your device setting), or set the data rate to the speed of your target devices.

By default, the Celerity FC host adapter autonegotiates these parameters.

6. Save the changes and restart the computer with the Fibre Channel device attached

Fibre Channel device is faulty

Problem: A faulty Fibre Channel device is connected to the Celerity FC host adapter.

To troubleshoot this problem, perform the following steps:

1. Disconnect all Fibre Channel devices from the host adapter and reboot the computer.

2. Attach one Fibre Channel device with a different cable, and then reboot the computer.

3. Repeat 2 until the problem occurs.

4. Watch the LED indicators on the Fibre Channel devices before, during, and after startup.

Drive LEDs should flash at startup when the Fibre Channel port is scanned.

5. If the ATTO Configuration Tool does not launch, verify that the latest Java version is installed.

6. Replace the host adapter.

Computer does not boot with the Celerity FC host adapter installed

Problem: The computer does not boot with the Celerity FC host adapter installed.

To troubleshoot this problem, perform the following steps:

1. Ensure that the host adapter is seated properly by powering down the computer and reseating the host adapter.

2. Move the host adapter to a different slot.

   If the problem persists with the host adapter, replace it with a new host adapter.

3. Ensure that the PCIe adapter is installed in a slot configured as x4 or x8.

4. Zap the PRAM (**Command+Option+P+R**) at boot. Allow it to chime three times.

5. Disconnect all Fibre Channel devices from the host adapter and reboot the computer.
   - If this corrects the problem, check the Fibre Channel cable, SFPs, or Fibre Channel target devices as described in "Fibre Channel device is faulty" on page 58.
   - If the computer does not boot, install the host adapter in a different computer.
   - If the host adapter works in the new computer, contact HP and report this as a possible interoperability issue between the host adapter and the computer.

Mac OS X stops and displays a flashing question mark

Problem: With the Celerity FC host adapter installed, the operating system stops and displays a flashing question mark, indicating that the hardware cannot find an operating system from which to boot.

To troubleshoot this problem, perform the following steps:

1. Boot the computer from a CD or some other source.

2. Check the System Preferences field to ensure that the startup disk is defined as `Startup disks`.

NOTE:

The Celerity FC host adapter does *not* support booting from an external Fibre Channel drive.

Server freezes or hangs

Problem: The server freezes or hangs.

To troubleshoot this problem, disconnect all Fibre Channel devices, and then reboot the computer.

- If the server continues to hang:
  1. Remove the nonessential PCI cards to determine if there is a PCI bus conflict.
  2. Remove the host adapter and test it in a different model computer.
  3. If the problem persists with the host adapter, replace it with a new host adapter.

- If the server no longer hangs:
  1. Verify the cable integrity:
     - Check the cable connections.
     - Inspect the SFPs for physical damage.
     - Replace the SFPs if necessary.
     - Inspect the cable ends for dirt or abrasions, which can affect communication.
  2. Boot the server and use the ATTO Connection Tool to:
     - Set the connection mode to **PTP**.
     - Set the data rate to the speed of your target device.

       By default, the Celerity FC host adapter autonegotiates these parameters.

- Save the changes and restart the server with the Fibre Channel device attached.

3. Watch the LED indicators on the Fibre Channel devices before, during, and after startup.
   - Drive LEDs should flash at startup as the Fibre Channel port is scanned.
   - If a drive LED remains on when the server freezes, there is a problem with the drive.

ATTO Configuration Tool does not show an online status for a device

Problem: The ATTO Configuration Tool does not show a device status as online.

To troubleshoot this problem, perform the following steps:

1. Check the power and data connections to all devices.

2. Use the ATTO Configuration Tool to identify inactive paths.
   - The Celerity FC host adapter and target WWPNs identify the endpoints of the path.
   - If you have intermediate devices, such as a Fibre Channel switch, you may need to use the management software for those devices to find the problem.

3. Use the ATTO Configuration Tool to identify the host adapter channel.
   a. In the multipathing window, select the path that you want to identify.
   b. Right-click (or press Ctrl+click) the path and select **Identify** from the menu.

      A check mark appears next to the Identify menu item, indicating that the path is being identified.

      The link LED blinks continuously for the host adapter channel associated with the path.
   c. After you have identified the Celerity FC host adapter channel, select **Identify** from the menu to stop identification.

4. After you have identified the faulty path, verify the cable integrity:
   - Check the cable connections.
   - Inspect the SFPs for physical damage and replace them, if necessary.
   - Inspect the cable ends for dirt or abrasions, which can affect communication.
   - Replace the cable.

   As you replace components in the path, the ATTO Configuration Tool automatically refreshes the display to indicate changes.

5. Repeat Step 2 through Step 4 until the device status is `Active`.

Path disappears from the ATTO Configuration Tool after rebooting the server

Problem: A path disappears after rebooting the server.

This problem can occur if the missing path failed prior to reboot. You must repair the path and then reboot the server.

ATTO Configuration Tool does not display paths

Problem: The ATTO Configuration Tool does not display paths or the Path tab is unavailable.

This problem occurs when an unsupported Celerity FC host adapter driver or ATTO Configuration Tool are installed instead of the driver and ATTO Configuration Tool developed specifically for EVA.

To troubleshoot this problem, perform the following steps:

1. Use the Terminal command `Kextstat | grep ATTO` to verify the host adapter driver version and ATTO Configuration Tool version.

    See Supported hardware and software for the supported versions.

2. Reinstall the host adapter driver or ATTO Configuration Tool, if necessary.

Escalation checklist

If you cannot resolve a problem using the information in this guide, collect the following information before escalating the issue to technical support personnel:

- Computer model
- Operating system
- OS patch level
- PCI or PCIe slot number and type (for example, x4, x8)
- Celerity FC host adapter driver version (available from the ATTO Configuration Tool)
- List of all devices attached to the host adapter
- Did this configuration ever work?
- Is this a new error or is this an error that has occurred since the configuration was installed?
- How often does the error occur?
- Can you duplicate the error?
- Does the error occur sporadically, randomly, or consistently?
- Collect and include:
    - ASP output
    - IORegistry output
    - Dump of ATTOCelerityFCLog utility at the time of the error
    - Terminal output from the `Kextstat | grep ATTO` command
    - Terminal output from the `Java - version` command

Index